School Shop

vol. XVIII No. 5
JANUARY 1959

"What Knowledge Is of Most Worth"
by Stanley J. Pawelek

Wood Basket of Metal
by Michel G. Temple

Compound Sine Plate
by Michael J. Matanich

Machine Shop to Astronomy

Cover Story: Instructor John Cooney at the Edgewood, Maryland, High School, using a well-planned and colorful teaching aid with his students. For a description of such teaching aids, see page 14. (Photo by Don Nicholas, Bel Air, Md., High School.)

THE MAGAZINE FOR TEACHERS OF INDUSTRIAL EDUCATION

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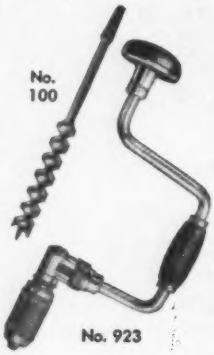

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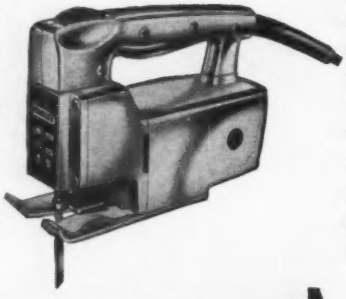

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School Shop

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Vol. XVIII, No. 5 **January 1959**

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School Shop TALK

COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

Attitudes, Attitudes, Attitudes!

The late Dale Carnegie wrote a book some years ago entitled *How to Make Friends and Influence People* that became an overnight best seller and still is going strong. Obviously the millions who have bought the book recognize the desirability of having friends and are willing to spend money to find out how to win them.

One of the points covered by Carnegie had to do with the important part "attitude" plays in the success or failure of man's activities. We all know this but sometimes forget it. If you enter a game with the attitude that the other team is unbeatable, your chances of losing are increased tremendously.

If your attitude toward your job is such that your first concern is quitting time or the few dollars you expect to get on pay day, that promotion you hoped to get may go to the other fellow whose qualifications, in your humble opinion, are much inferior to yours. Naturally this evidence of what you consider to be rank discrimination makes your attitude even worse.

All of this leads up to the importance of the shop teacher developing good attitudes in his school contacts. For example, do you assume that the janitor represents a lower form of human life than you who occupies the exalted position of shop teacher? If you do, your attitude may be wrong, because he may be superior to you, both mentally and physically. Moreover, he has a function to perform which is vitally important to the school. He is a person and, as such, has a right to be treated as one. If you fail to recognize this, we leave it to you to guess how his attitude toward you will be affected.

Another area worthy of some selfstudy is your attitude toward the total school program. Do you feel that your department is a separate show which must be run independently of other school activities? Do you believe that your subject is the only one that can be fully justified in the school program? Or do you consider yourself a member of a team which is making a contribution to the total education of youth?

What is your attitude toward the school administration? Are you one of its loyal supporters? Or are you a subversive agent who tells your friends among the citizenry that the superintendent and principal are incompetent and that, if you were responsible for the administration of the schools, things could be different and, of course, would be better?

How is your attitude toward your pupils? Is it kindly? Is it charitable? Is it impartial? Do you greet your classes cheerfully when you meet them and do your pupils show evidence of confidence in you and respect for you? Youngsters are keen observers and are quick to detect weakness on the part of their teachers. They resent partiality and respond favorably to indications that the attitude of the teacher toward them is one of helpfulness.

Then there are the slow learners. What is your attitude toward them? Do you classify them as "dumbbells" and are you impatient with them? Or do you encourage them and give them credit when it is apparent that they have really tried to do their best?

Is your attitude such that you resent being called on to assume your share in carrying on the extra-curricular activities of the school? Or do you cheerfully accept this work as one of your responsibilities?

What is your attitude toward your fellow teachers? Is it cooperative or are you a lone wolf who announces to all and sundry that you attend to your own business? In other words, are you playing the game by yourself or do you consider yourself to be a member of a team which is striving to provide youth with a broad education?

Attitudes, attitudes, attitudes everywhere in the daily work of a teacher! These are tremendously important because they affect directly the quality of teaching being done. Therefore, teachers should examine themselves for the purpose of assuring themselves that the attitudes they assume are reasonable, that they are sound, and that they tend to create conditions in which the instruction given becomes more beneficial to students.—*T.D.*

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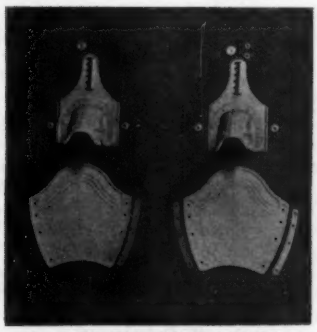
2. Lay out pattern on blank
3. Cut blank to length
4. Add spline at aft end
5. Band saw shape
6. Shape edge
7. Flat sand
8. Edge sand
9. Seal and seal sand
10. Varnish and wax
11. Drill for fittings
12. Make rudders
13. Assemble

INSTRUCTOR: Please post this ad on bulletin board.



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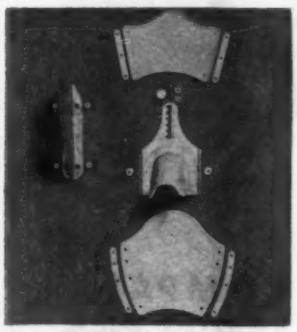

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IN THE *Morning Mail* . .

[Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Michigan.

Dear Sir:

Score one more for the type of article like "Happiness Means More Than Money in the Bank" in the October issue. I believe that the men in the field sometimes can't see the forest for the trees. So many of them are happy, but don't stop to realize it . . . and much further, why.

I like a sprinkling of these items. Perhaps we ought to tap other sources for more articles of this type.

May I also commend the authors of "Fynarta" in the September issue. The thought and theme was well done.

Norman B. Weingrow,
Russell Sage Junior-High School,
Forest Hills, N.Y. ★

Dear Sir:

Enclosed please find Shop Teachers Service coupons from the October issue of SCHOOL SHOP.

I have just taken over the shop here at Bloomfield and I am presently reorganizing it. I am sure these materials will be of great help to me.

I appreciate your magazine making it convenient to order materials this way.

Robert G. Haas,
Bloomfield Central School,
East Bloomfield, N.Y.

Dear Sir:

I want to thank you for the issues of SCHOOL SHOP which we have been receiving here for several years. We find the articles both interesting and instructive. Articles pertaining to new wrinkles in the teaching of drafting we discuss in class and have already adopted several of them. The magazines are then passed on to the shop instructor, who tells me he finds many articles which are helpful in his work.

I know of no other publication which contains such practical ideas and good, sound educational matter as does SCHOOL SHOP.

Arthur G. Wood,
Amesbury High School,
Amesbury, Mass.

Dear Sir:

I am requesting all free materials in the Shop Teachers Service in your October issue because the industrial-arts program is being added to the curriculum at Coleman High School and we do not have any material for aid.

Charles Daniel,
Coleman High School,
Pine Bluff, Ark.

Dear Sir:

This is my opportunity to express appreciation to you and your staff again for the splendid material we receive each month in SCHOOL SHOP. I sincerely believe that Michael Paca's Washington column is the most informative of any report available on what is happening to industrial education at the national level. If you charged subscription prices to school people, that column alone would be worth the price.

Von H. Robertson,
State Director, T & I Education,
Salt Lake City, Utah

Dear Sir,

Some years ago I had to make the important decision as to what field of endeavor I should pursue. Today, more than 25 years later, I am content with my choice of the special field of industrial arts. Let me tell you why . . .

The industrial-arts instructor is like a father teaching his sons how to construct a bird feeding station, or a windmill. In the industrial-arts shop, the teacher and pupil work shoulder to shoulder. It is here the students are taught industrial safety, occupational information, design, skills, and proper shop techniques. . . .

In our industrial-arts shop at South High School, we have an ideal set-up. Students elect the shop-drawing course where they take woodworking four periods a week and mechanical drawing two periods a week. Juniors and seniors have six periods a week—all devoted to cabinet making—since the larger projects are more time consuming. Many students, as they advance in mechanical drawing, design and draw up their own special projects.

In our shop we have carried out the "honor system" for many years. We have a large cabinet with special tools. Here students help themselves to whatever tools are needed for their particular job. In each boy's bench are his own general tools.

In our school, the administrative staff is deeply interested in our program. When visitors come to the school, their first stop is the industrial-arts shop. Here there is activity that catches the eye. We have a visitor's book, which was started in 1945. Today there are more than 500 signatures between its covers. We also have a large book filled with pictures of the Hobby Craft Club activities and other shop activities. These pictures were started in 1938. . . .

Many young men have said to me, "If it weren't for industrial arts I would have quit school at 16." If it takes industrial arts to keep teen-agers in school, then let's give them more of these practical subjects.

An old-time academic teacher once said to me, "I can see why these boys like this type of work; they don't have to use their heads." I assure you that this teacher changed his mind before he left our shop. Every move a boy makes in the shop requires thought, whether it is running a dangerous piece of machinery, or laying out a complicated desk. . . . And the young man who completes a beautiful piece of furniture gets the same thrill as the boy who runs 50 yards for a touchdown, or the boy who knocks a home run.

For these reasons, and many more, I am glad I am a teacher of industrial arts and vocational classes.

Ralph C. Mayo,
South High School,
Worcester, Mass.

Dear Sir:

Just a brief note to express again not only my own appreciation, but the appreciation of all members of the industrial-education staff at Indiana State for making available to us your excellent magazine, SCHOOL SHOP.

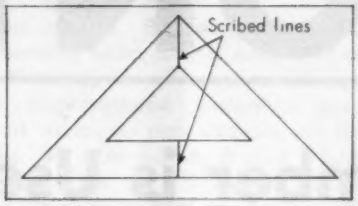
The high quality of this magazine with respect to the articles, the projects, and the service is appreciated by everyone. . . .

Cooperatively, we send to you our best wishes for your continued success.

Sylvan A. Yager,
Department of Industrial Education,
Indiana State Teachers College,
Terre Haute, Ind.

DRAFTING TIPS

Drawing perpendiculars



Drawing perpendiculars to a line on a drawing that is not horizontal or vertical can be tricky. An easy and accurate method is to scribe a line perpendicular to the long edge of a triangle. The long edge can then be placed accurately on the already-drawn line, and a point marked to locate the perpendicular.

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With the new POST drafting kit, the student can easily carry everything he needs for drafting. The drawing board with metal edges, 20" x 26", is POST'S best quality basswood.

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PHILIPPINE MAHOGANY	GENUINE MAHOGANY	CYPRESS
AROMATIC RED CEDAR	AMERICAN BLACK WALNUT	SUGAR PINE
BLACK WILLOW	WHITE OAK	NO. 1 SHOP SUGAR PINE
BIRCH		BALSA

Brodhead-Garrett's 1957 school lumber sales records will be used as the master list of popularity in judging. Three closest contestants to that list will be awarded the above prizes. In case of ties for any prizes, postmarks will determine winner. Contest closes Feb. 1st. Winners announced in our ads at a later date.

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Fill out and send this coupon before Feb. 1st.

BRODHEAD-GARRETT CO., Dept. SS
4560 East 71st St., Cleveland 5, Ohio

My estimate of the 20 woods used most in school shops in the order of their popularity is as follows:

1_____	8_____	15_____
2_____	9_____	16_____
3_____	10_____	17_____
4_____	11_____	18_____
5_____	12_____	19_____
6_____	13_____	20_____
7_____	14_____	

My name_____

Title and Subject taught_____

School_____

Address_____

City_____ State_____

A meeting of minds on the matter of

"What Knowledge Is of Most Worth"

By Stanley J. Pawelek

Supervisor, Industrial Arts, Baltimore, Maryland

Illustrations by Mary Martha Beierwaltes

AN old man sits on the front porch of his home overlooking a busy street leading past the new high school just a block away. He rocks and smokes his pipe and muses as he watches the noisy parade of cars, bicycles, and pedestrians moving toward the school in the morning and back again in the afternoon.

"Things have changed, ain't they? When I was a boy . . . kids went to school to get educated . . . carried their lunches . . . walked miles . . . no cars. None of these fancy buildings . . . swimming pools . . . gymnasiums, cafeterias, libraries . . . and all that stuff they think is necessary for education. They tell me that these kids can't read nor spell nor figure any more. Football and dancing to rock 'n roll music is what the schools lay a lot of store by today. Seems like the kids go to school to be entertained, not educated any more. Good citizens. Ha! How can anyone think that way?"

At this point in his reverie, a young man walks past. Tall, good looking, well groomed, personable. He looks up at the old man and, with a smile on his face as well as in his voice, says, "Nice day, isn't it?"

"Yup. Sure is. Young feller, I've noticed that you walk past here every morning and afternoon. You teach at the high school, do you?"

"Yes, I do."

"You like it?"

"Oh, yes, sir, we have an excellent school here. I'm very lucky to be on this faculty. Not many young teachers have a chance to start teaching in a brand new building like ours, and in such a fine community. It's really much better than I hoped for when I was graduated from college. As our kids would say, 'it's out of this world.' "

"What do you teach up there?"

"Well, sir, this may sound sort of strange to you, but we don't think so much of *what* we teach as of *whom* we teach. We like to think that we teach *students*. We feel that the most important phase of our work is to develop good citizens. We want them to *be* something rather than to *know* a lot of facts and figures. We stress such things as cooperativeness, leadership, good work habits, the right attitudes, and the like. We want them to develop a faith in themselves and a wholesome respect for the rights and beliefs of others. In other words, we are trying to develop well-rounded individuals who can assume their roles in this democratic society."

"I see. But don't you try to teach them some things that everybody needs to know no matter what role they will play in this democracy? Like reading and writing and arithmetic and some science and history and the like? Seems to me these things are important, too."

"Why, of course. Those things *are* important. And *we do* give our students what we call *general education*. Good citizenship *includes* certain basic skills such as you mention, and every teacher is very conscious of his or her responsibility to see to it that youngsters express themselves well both in writing and speaking; that they can do the basic operations in mathematics; that they understand the scientific phenomena about them; know some history of their own country and the world and so on. We like to think that all of our teachers work as a team to try to develop each student to his fullest capacity. You've probably heard it said that every teacher is an English teacher . . . that's the way we like to operate."

"Are you an English teacher?"

"No, not exactly. As I said, it is my responsibility to see to it that my stu-

"Things have changed, ain't they? When I was a boy . . . kids went to school to get educated . . "

dents use the English language correctly, but I wasn't hired to teach English, if that's what you mean."

"That's what I mean, all right. What I want to know is what *were* you hired to teach? Isn't it true any more that we have teachers of history, or English, or science, or what have you?"

"Oh, I see what you mean now. My major field is industrial arts."

"I guess you got me again. For the life of me, I couldn't tell you what that means. That must be something new. You know, it's awfully hard to keep up with all these new-fangled things in our schools. Does it have something to do with art?"

"Not exactly. Although I guess I should say it does. We *do* try to use the principles of art in doing what we do. I guess art is one of those things everyone can use. We feel that it should be a part of the general education of all people."

"I agree with you, but you still haven't answered my question. What is this you teach that you call industrial arts?"

"You're right. I haven't. I guess when you went to school they called it manual training. You know—working with tools, machines, wood, metal, mechanical drawing, and such. Well, today we refer to this area of education as industrial arts. You might understand me better if I said, 'Industrial arts is manual training grown up.' It is *shopwork*, with the addition of a lot of related information which we feel a youngster should know."

"Now you're cooking with gas, young feller! Why didn't you say that in the first place? Why do you teachers have to call things by fancy names instead of what they really are? Now 'shopwork' or 'manual training' makes sense. Why confuse people by calling it something else? 'A rose by any other name—,' you know."

"Oh, say, I've enjoyed chatting with you so much that I forgot about being over at school ahead of time. Some boys are coming in early to finish their projects in time for the P.T.A. meeting tomorrow. I'll stop by again when we can have more time to continue our discussion. By the way, my name is Johnson. What is yours, sir?"

"The name's not really important, now is it? Why not call me 'Old-timer' and let it go at that? My friends call me Rufus. The last name is Taylor. So long, now."

"See you again, Old-timer—pardon me, Mr. Taylor."

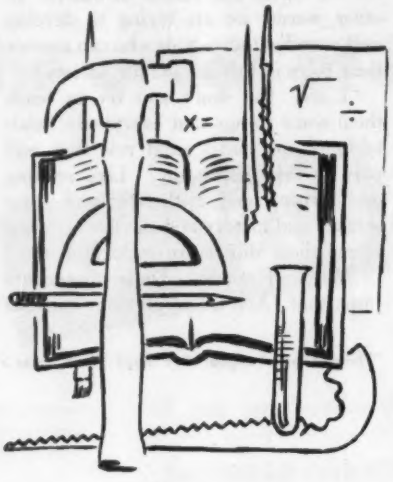
The old man's eyes followed the retreating Mr. Johnson. "I missed a lot by not having a college education. They speak a different language from mine. Yup. Things are different, all right."

The morning passes. The street and sidewalks are relatively free of traffic. As the afternoon wears on, the old man dozes off until he is awakened by sounds quite familiar to his ears by now. Shrieking, laughing, scuffling, yelling. The sound of auto horns penetrates all the others, including the raucous noises of dual exhausts—and screeching brakes. The parade in reverse is now in full swing. School is out for the day.

"What you got there, son?"

The question is addressed to a young lad about fourteen who is walking past rapidly and casting admiring glances at an article he is carrying in his hand.

"A necktie rack, sir."



"Where'd you get it?"

"I didn't *get* it anywhere—I *made* it."

"You *did!* Well, now, that looks like a right nice piece of work. Did you make it in your industrial-arts class?"

"No, sir. I made it in the woodshop. Mr. Johnson, our teacher, told me that this was the best job in the whole class. I'm very anxious to have Mom and Dad see it 'cause they think I'm kinda dumb in school. But I like shopwork."

"You like Mr. Johnson?"

"Yes, sir, I like him all right. Only if he didn't talk so much and let us kids work. Sometimes he shows us movies. Good ones, too. About lumbering, and furniture making, and all that stuff, but then we don't have enough time to work on our jobs and we have to come in early in the morning or stay after school to finish them. Then he makes us keep notebooks, too, just like the other teachers. We kids think that isn't necessary in shop."

"Well, now, you want to be educated, don't you? All of that is a part of your education, you know."

"I know, but why do we have to go to *shop* to learn all that stuff? We get about the same thing in our other classes. You know—reading books, looking at movies, keeping notebooks, writing reports, and all that junk. Shop is for making things, not for studying. It's fun to work with the different tools and stuff."

"Maybe you're right, son. I don't know. You better run along now so you can show off your necktie rack. I'm glad you stopped to show it to me."

"Oh, that's all right."

That night, Mr. Johnson had trouble dropping off to sleep. Counting sheep and all other methods he had heard about just did not work. The old man in his rocking chair and his pipe between his teeth haunted him. He could hear him say, over and over again, "Don't you try to teach them something . . . like reading and writing and arithmetic . . . are you an English teacher . . . what were you *hired* to teach . . . call things by fancy names instead of what they really are . . . shopwork . . . manual training . . . industrial arts . . . 'a rose by any other name' . . ."

He tried recalling some of the courses he took in college. There were "Philosophy of Industrial Arts" taught by Dr. Doby, and "Methods of Teaching Industrial Arts" by Dr. Ruff, and "Course Organization," and "Child Growth and Development," and all the others. Wonder what that old-timer, Mr. Taylor, would think if he talked to the professors that taught these courses? Somehow or other, it all seemed so logical and practical when they lectured. The books they assigned, and magazine articles, all seemed to make such good sense. He's just old fashioned—not up to the newest ideas in education. After all—his experience with it goes back many years. What could one expect? Why worry about what *he* thinks? Yet, he is a citizen and taxpayer—our public, so to speak.

The kids. How do they feel about it? They are interested only in what they can *make*. And they don't call it "industrial arts"—come to think of it—they always say "shop." It's always "woodshop" and "machine shop" and "electric shop" and "print shop." And they groan when we announce movies and filmstrips, even though they seem to enjoy them at the time. Somehow or other, they resent anything that takes away from their work time. They're

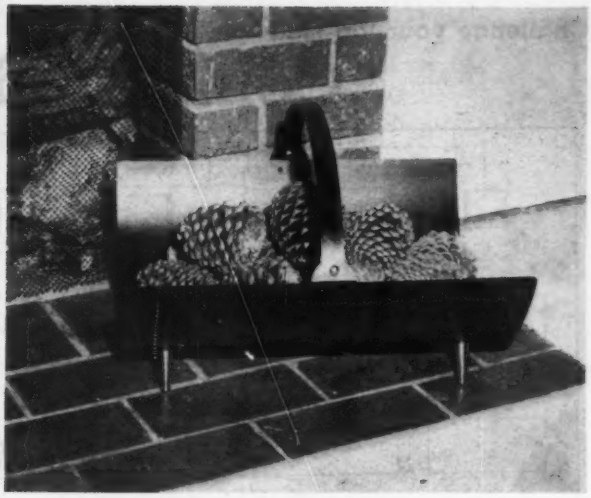
(*Continued on page 26*)

Function and beauty meet in this

Wood Basket of Metal

By Michel G. Temple

Birmingham High School, Van Nuys, Calif.



The wood basket of metal (right) placed before a fireplace. It has capacity, beauty, and strength.

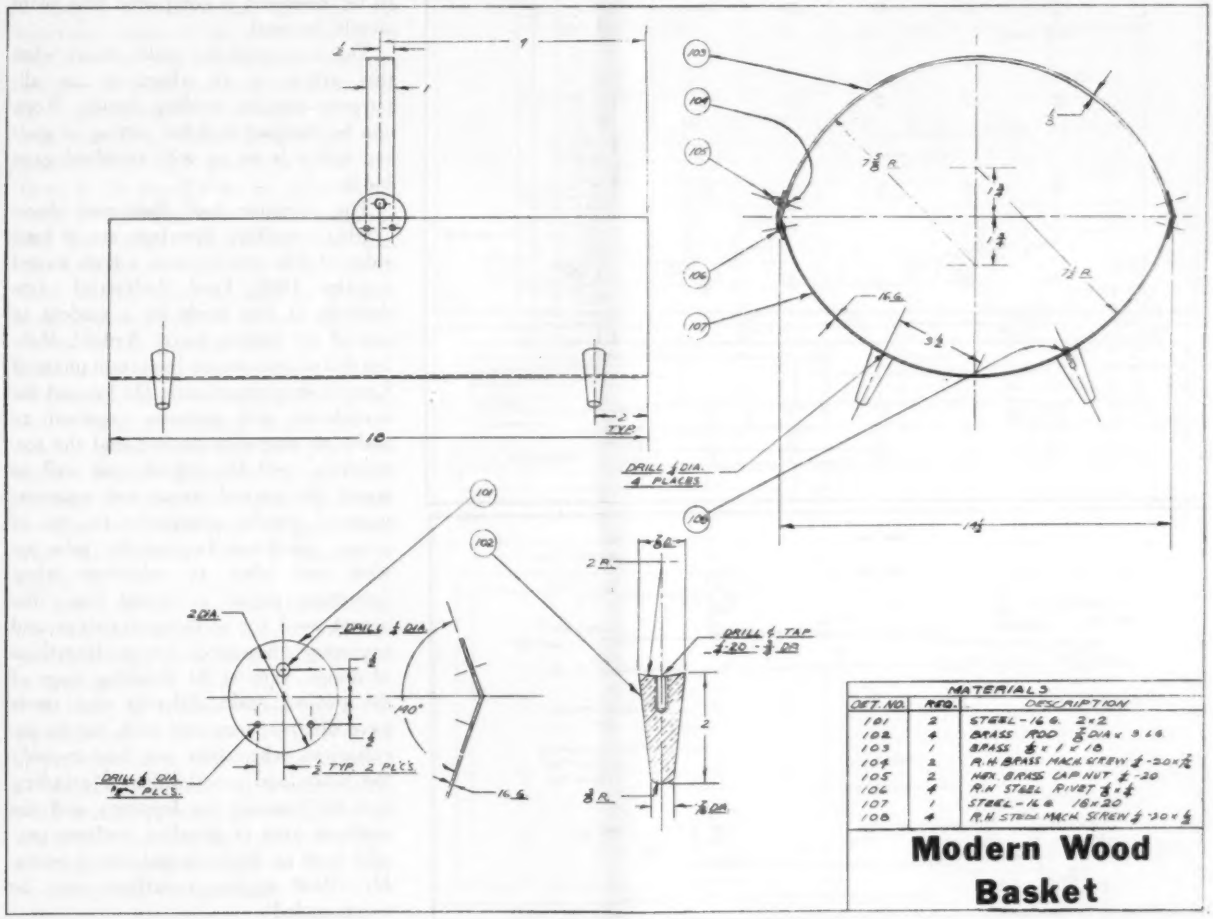
ATTRACTIVENESS, educational value, and functionality are three criterions teachers generally have in mind when appraising projects for their students. If these three values have been eluding you in some of the projects you have looked over recently, perhaps you will recognize them in this wood basket.

This project, you will note readily, is not difficult but it is enough of a job to give a student a chance to do several operations in a general-metals course.

This project is made of brass and steel. The handle and legs are brass and the rest of it is 16-gage cold rolled steel.

Some of the operations students will have to do making this project are: layout, filing, riveting, buffing, use of squaring shears, hand shears, center punch, drill press, and forming rolls. The lathe will have to be used for facing, drilling, tapping, and turning the legs.

From the standpoint of design, several points should be noted. They are: (1) This project has utility. It is durable, easy to load with wood, and just as easy to unload. (2) The design of this project is simplicity "plus." (3) It's good looking and it works. ★

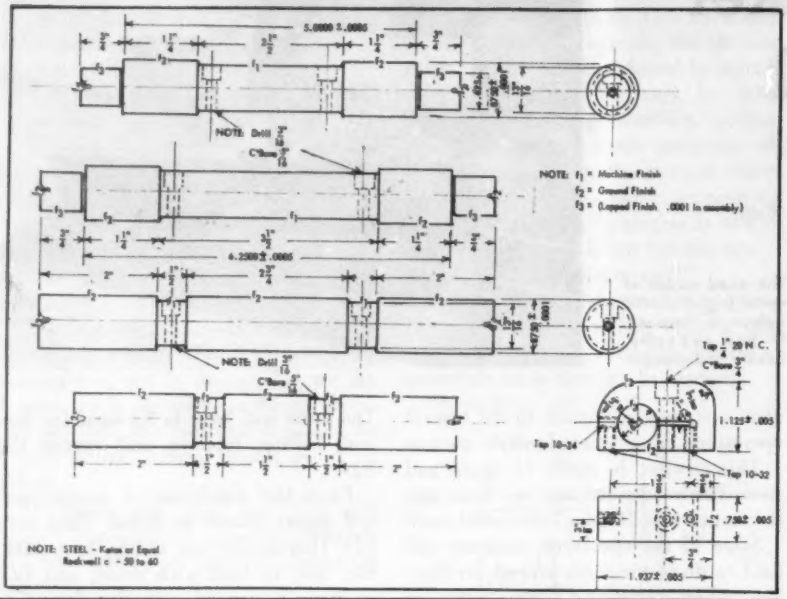


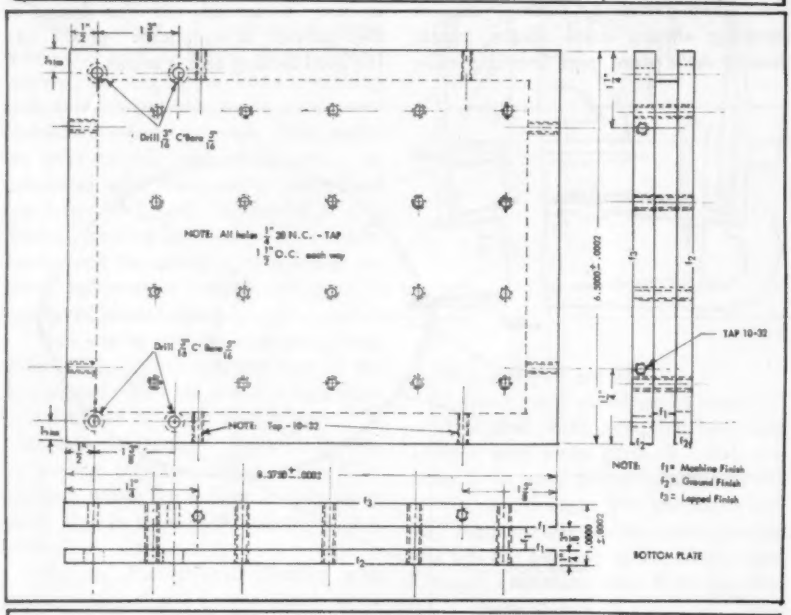
MATERIALS		
DET. NO.	REQ.	DESCRIPTION
101	2	STEEL - 16 G. 2 × 2
102	4	BRASS ROD ⅜ DIA × 3 LG.
103	1	BRASS ⅛ × 1 × 18
104	2	R.H. BRASS MACH. SCREW ¼-20 × ⅝
105	2	HEX. BRASS CAP NUT ¼-20
106	4	R.H. STEEL RIVET ⅛ × ¼
107	1	STEEL - 16 G. 18 × 20
108	4	R.H. STEEL MACH. SCREW ¼-20 × ½

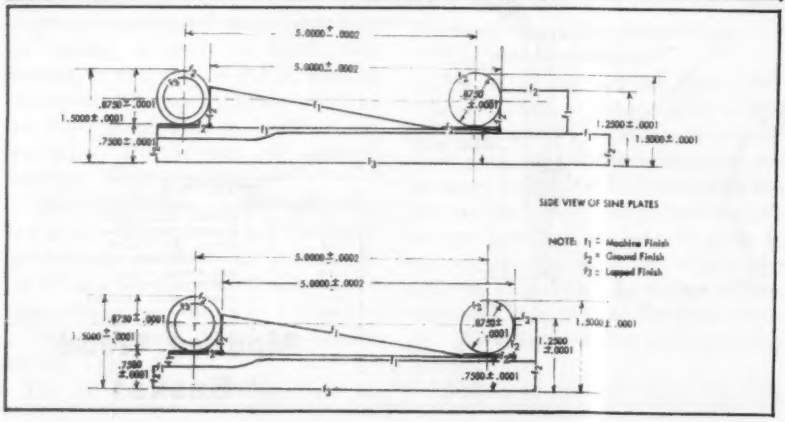
Modern Wood Basket

Challenge your top students

Compound Sine Plate







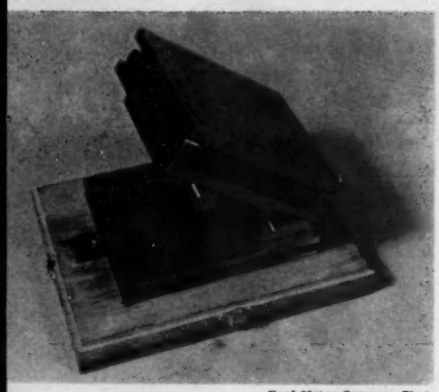
By Michael J. Matanich
Staples, Minnesota, High School

SURFACES that form an angle to each other are very difficult to measure. They can be very complicated if the tolerance is quoted in degrees. Why? Because the tolerance, beginning at 0 at the apex, can increase as you progress away from the apex along the sides of the angle. This type of measurement is not at all desirable. The linear method is much better because the tolerance zone can be learned from two planes.

How, then, you wonder, can a machinist measure a tolerance, cut, or check a specific angle in thousandths when the machine he is working with is calibrated in degrees? The only possible way to cut and check an angular tolerance is by measuring the two coordinates. And, for setting up and checking this angle, the machinist has to use a sine bar and surface plate. If compound angles are to be measured, a compound sine plate should be used.

The compound sine plate—that's what this article is all about—is an all-purpose angular holding device. Work can be clamped to it for cutting or gaging and it is set up with standard gage blocks.

The precision tool illustrated above (right)—working drawings are at both sides of this article—won a high award in the 1958 Ford Industrial Arts Awards. It was made by a student in one of my classes, Larry Axdahl. Making this project was an important phase of Larry's shop experience. He learned the confidence and patience required to make an extensive project and the tremendous need for precision as well as speed. He learned layout and measurement of angular tolerances; the use of proper machines for specific jobs, or what and when to substitute when "roughing down" to layout lines; the urgent need for working drawings and necessary allowances for modifications of design, even at the finishing stage of the project; that different tool steels have different uses and each has its peculiarities when they are heat-treated; the limits and possibilities of grinding and the reasons for lapping; and the methods used in grinding surfaces parallel or at an angle, in and out of assembly (these angles or surfaces may be compounded).



Ford Motor Company Photo

The compound sine plate that won high honors in the 1958 Ford Industrial Arts Awards. The precision needed to make it dazzles even the top craftsmen in their fields.

Very briefly, the procedure Larry followed in making the compound sine plate follows:

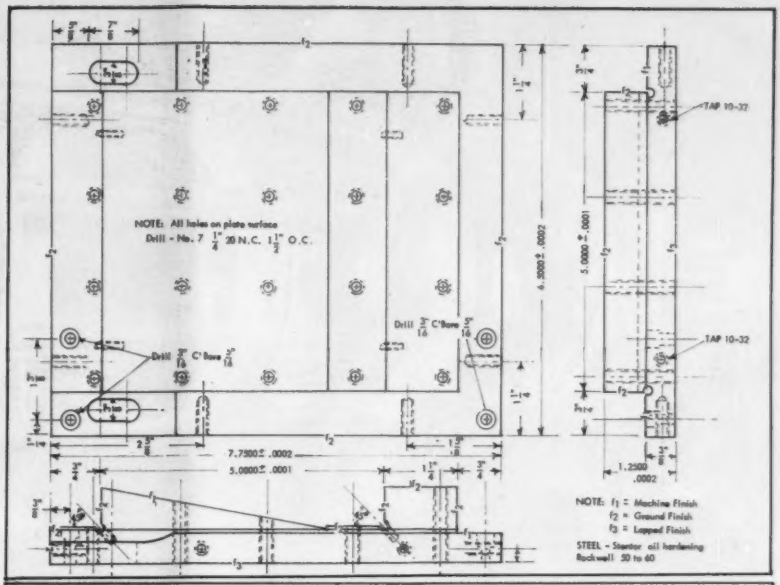
He planned and designed the project by making a set of working drawings. Then he carefully chose the proper steel. He wanted a steel that would distort the least under heat-treatment and one that would remain stable while the tool was in use. Next he squared and finished the block of steel to proper size for layout. This was followed by roughing down the blocks to the layout lines with a proper allowance for grinding. He carefully followed the specifications of the steel in the heat-treating process, keeping in mind the use for which the tool was intended.

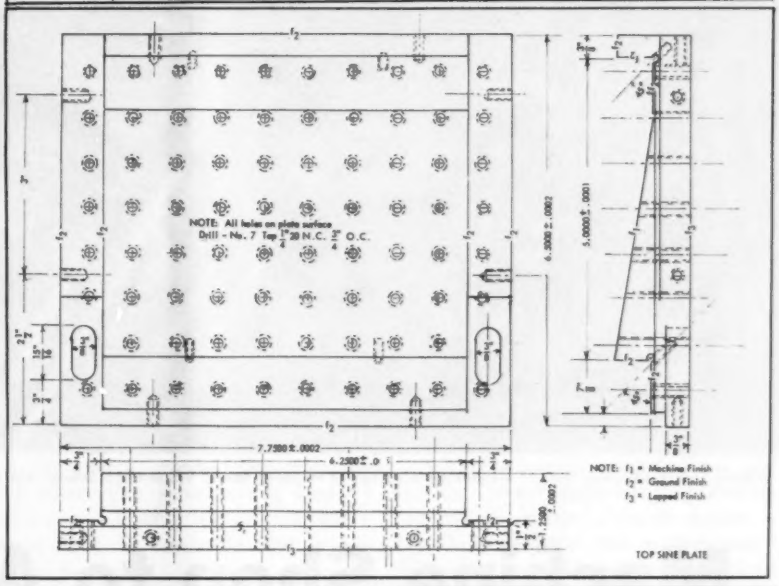
In grinding, tolerances are very important. Therefore, setups to grind surfaces to be parallel or at right angles must be checked very, very carefully and very often. He remembered, too, that for surfaces that are to be lapped later, chatter must be kept to a minimum. Consequently, a correct sequence for grinding surfaces had to be followed.

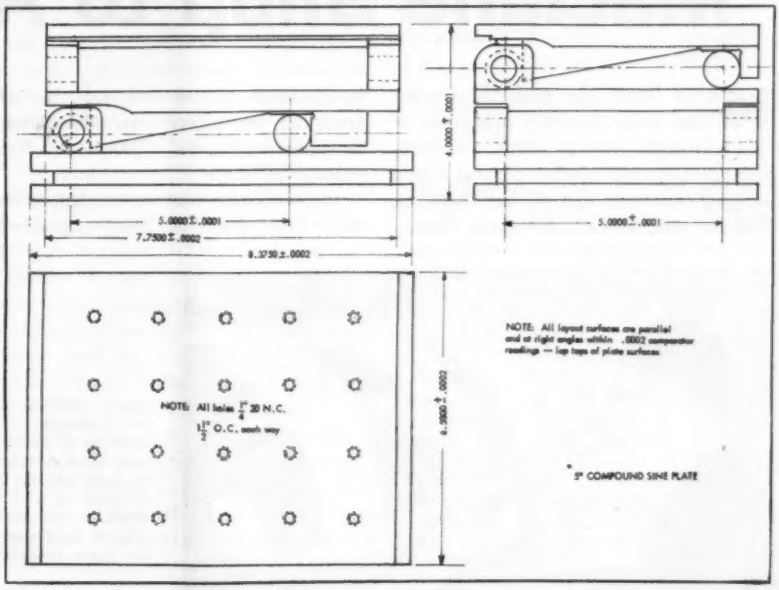
Adhering to an extremely high standard of tolerances, Larry found that assembly of the compound sine plate was not too difficult. He carefully, and often, checked the hinge blocks and standards so that he maintained a parallelism when the plate was tilted to the proper angle.

Finally, he made a complete and thorough demonstration in uses of the compounded angle plate to see if it worked as it should.

A word of caution: This project is possible only if the student who is going to make it has a thorough background in the fundamentals of machine-shop work and a working knowledge of all machine-shop tools. He should also have a complete understanding of shop trigonometry and mathematics. ★






4.0000±.0001
5.0000±.0001
7.7500±.0002
8.3750±.0002
NOTE: All holes 1/4" 20 N.C.
1 1/2" O.C. each way
6.2500±.0002
NOTE: All layout surfaces are parallel and at right angles within .0002 comparator readings — top face of plate surface.
5" COMPOUND SINE PLATE

William Sauter adjusting the 12" Newtonian telescope in Hopkins, Minn., Senior-High School. He and students spent two and one-half years making it.

Machine Shop to Astronomy

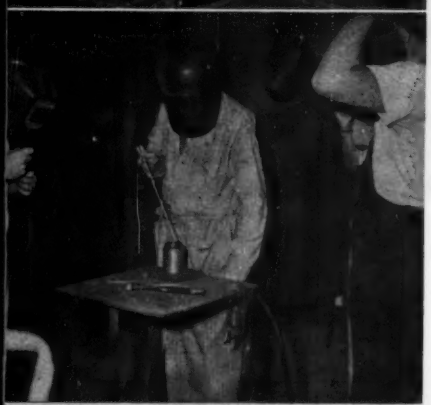
MANY years ago, probably a great deal more than the principals of this tale would care to admit, a science-and-physiography teacher planted a seed of inspiration in one of her students. Today, students of Hopkins, Minn., Senior-High School are enjoying the fruits of her efforts: an observatory, complete with a 12", 700-power, Newtonian* telescope.

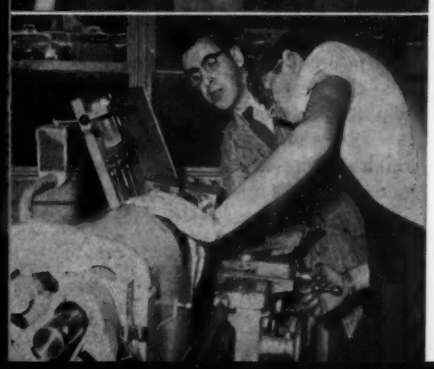
Ruth Askland was the teacher of that other time; Lawrence Sauter, presently a machine-shop teacher, was the student, and Hopkins Junior-High School was the place. She revealed the mysteries and challenge of the heavens to young Sauter when he was a ninth-grader. He immediately built a telescope so that he could see for himself, when he wanted to, what she talked about. This was the first of the telescopes that he has built.

Sauter looking into the telescope. Note opening in observatory dome and how he looks into the instrument at a right angle, a characteristic of the Newtonian type telescope.

The pictures on these pages show Sauter's greatest effort, the 12" Newtonian. Not only do they illustrate the tremendous craftsmanship and engineering ability that is his, or the salesmanship—have you ever tried to "sell" a school board on the idea of an observatory?—but also they point up the sublimeness of his concern for the educa-

The telescope was built in the Hopkins High machine shop. These photos show, from top to bottom, the processes used to make the many fine parts. Starting from the top: Sauter checking over the work being done on a shaper; a student and Sauter examining a match plate; students welding; Sauter inspecting a part being turned by a student on lathe.





At right: Hopkins students Dannielle Baer (left) and James Loving (center) working with teacher and telescope builder, Lawrence Sauter, in the observatory. The instrument panel indicates the delicacy and balance of the apparatus and its complicated controls.

tion of Hopkins students. This telescope and observatory show, too, that a machine shop can be more than a place for students to learn how to run a lathe, a drill press, to weld, or cast metal. It can be and is a part of the whole of the educational process. This telescope and observatory show, too, a level of proficiency, lacking in all too many shops, that is attainable and which should be sought.

Approximately 100 of Hopkins' students have elected to spend their activity periods studying astronomy, listening to lectures, doing research, and making reports. And on clear evenings, many of them return to school, climb inside of the observatory to study the stars, the craters of the moon, the four moons of Jupiter, or other phenomena of the universe invisible to the naked eye.

Sauter hopes his observatory will serve several purposes, among them the awakening of an interest by students in science and an appreciation for that which is beyond the life which he feels we take for granted.

Sauter glows with pride and enthusiasm when he recalls the discussions that have grown out of sessions at the telescope. "Once, when we were looking at a comet," he said, "we began talking about radio telescopes piercing the unknown in the universe. Soon the youngsters were really thinking. Asking a lot of questions. Sometimes a student who is not interested in anything in particular begins to have his interest aroused through astronomy."

Not a dreamer by any definition—the two and one-half years he spent developing the observatory prove it—Sauter is nonetheless hopeful that perhaps something big, real big, might result from the observatory and Hopkins students. He mused, "Wouldn't it be something if this could help produce another Galileo, or a Bell, or a Hubbell?"

And this man is a machine-shop teacher! ★

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*A Newtonian telescope is a reflector type in which rays of light from the parabolic mirror converge and fall into a prism or a small optically flat mirror within the telescope tube near the open end. From this surface they are reflected at right angles to the side of the tube where the eyepiece (the ocular) is mounted. Thus, the observer looks into the instrument at right angles to the tube.

Photographs are by Howard Ernst and Dennis Sarenpa, students in the industrial-education department, University of Minnesota, Minneapolis, and courtesy of the *Minnesota Journal of Education*. Information for this article came both from Professor William J. Micheels, Chairman, Department of Industrial Education, University of Minnesota, and the *MJE*.

Take your pick!

A Visual Aid for Almost Any Occasion

The visual aids shown on these two pages were submitted for publication in SCHOOL SHOP by Professor Frank Steckel of the Department of Industrial Arts, University of North Dakota, Grand Forks. They were produced by students of that department. A brief essay, written by each student, is printed alongside each visual aid with his name following it.

Fluid Coupling . . .

THE automatic transmission is rapidly becoming considered a "necessity" rather than a "luxury." Despite improvements in construction and design, the basic principle—fluid coupling—still remains the same and is illustrated at left.

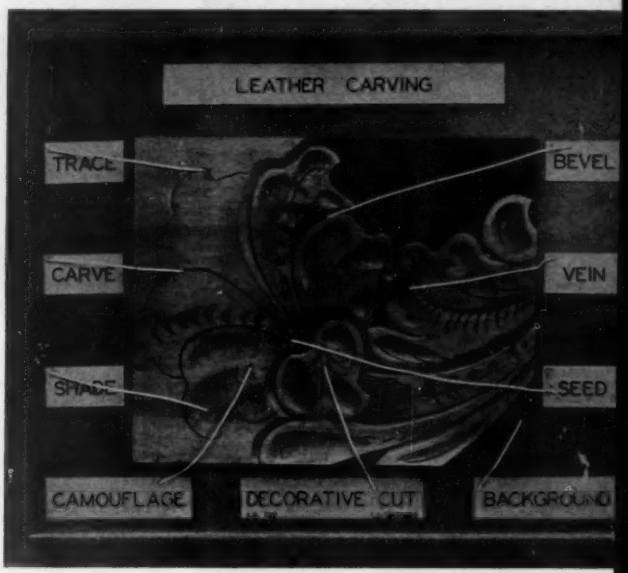
The three elements of a fluid coupling are: (1) a turbine or paddle mounted to an engine-connected shaft; (2) a second turbine connected to the drive shaft; (3) a medium, usually fairly light oil, surrounding the turbines, or paddles. At left, the hand represents the engine that turns the first turbine. The second paddle, or turbine, moves freely on a center post. Movement of the first paddle causes the oil to move in the same direction, eventually moving the second paddle and the drive shaft; consequently no clutch is needed. The more paddles there are, the more efficient is the coupling. — DONALD E. KNUTSON. ●

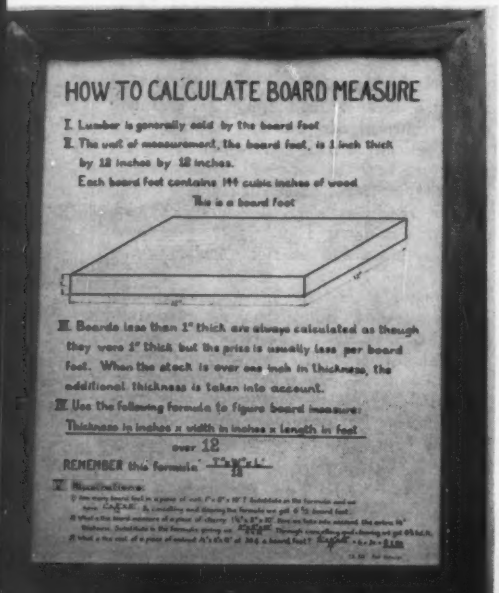
It's Really Wood . . .

STUDENTS often have trouble remembering the procedure and the tools when making leathercraft projects. Also a "picture" of what the project will look like when done would help the cause.

The visual aid at right, really made of wood but carved to look like leather, takes care of the above problems. This aid can be made with one solid piece of gumwood or a similar soft wood. It is 14″ x 12″ and the frame is 25″ x 20″. The visual aid proper can be tooled with regular carving tools and finished *au naturel*. This gives it a leathery appearance. The background, though, is dyed black.

The advantage of this aid over one made of leather is that depth is more apparent on wood and perception is more readily "seen." This aid is also handy for display purposes because it does show leathercraft.—JOHN GRUDEN. ●




HOW TO CALCULATE BOARD MEASURE
I. Lumber is generally sold by the board foot
II. The unit of measurement, the board foot, is 1 inch thick by 12 inches by 12 inches.
Each board foot contains 144 cubic inches of wood
This is a board foot
III. Boards less than 1" thick are always calculated as though they were 1" thick but the price is usually less per board foot. When the stock is over one inch in thickness, the additional thickness is taken into account.
IV. Use the following formula to figure board measure:
Thickness in inches x width in inches x length in feet
over 12
REMEMBER this formula:
V. Illustrations:

About Board Feet . . .

AMERICANS, a good many at least, are "do-it-yourselfers." Here is a visual aid (at left) that not only can be copied for use in any woodworking shop, but students can make a copy of it and take it home for use in their "do-it-yourself" home workshops.

The formula for computing board feet is relatively simple but this does not mean it is one that is easily remembered, or, for that matter, even learned.

The picture of this visual aid shows the "how" and "why" for board-feet measurement. It is made from a piece of 20″ x 24″ white "bristol board" and it is encased in a 2″ redwood frame.

It also offers a few examples plus a scale of *one* board foot.

Because of its simplicity and students' ability to easily grasp the idea from it, this aid has been found to be very helpful. As a matter of fact, it is not at all improbable that this large visual aid has more impact than many common textbooks on the subject.—ROLF SCHULZE. ●

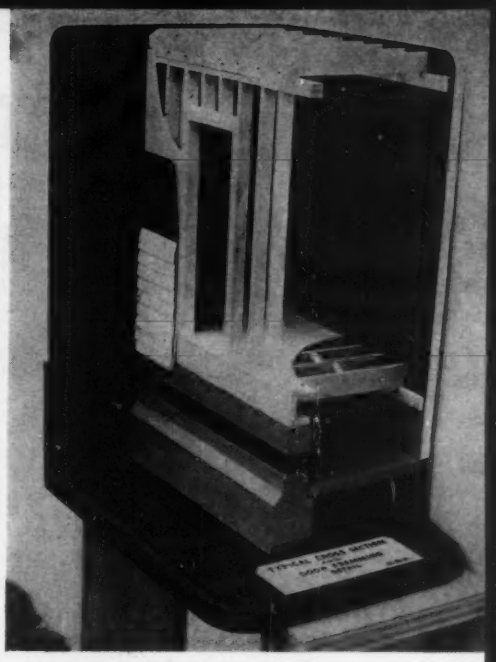
House Detail . . .

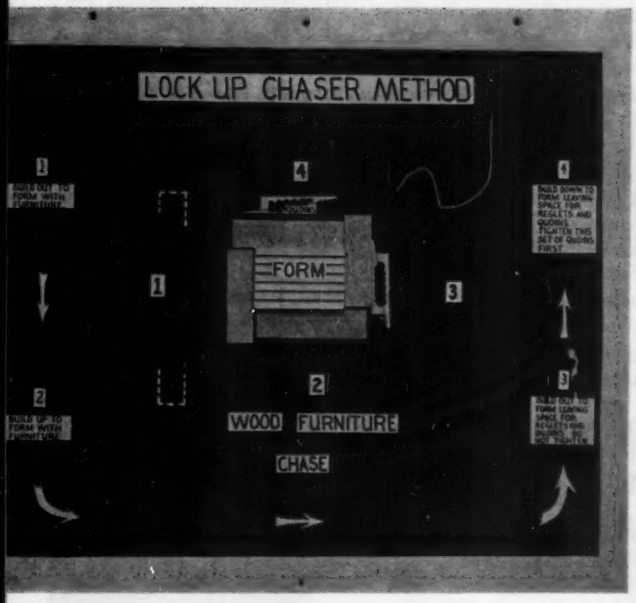
NEEDLESS to say, any attempt to build a house-construction detail —full scale—in a shop would, in most cases, not only be thwarted but prove to be too much of an undertaking. The scale model (at right), however, is "just the ticket" for most situations. It is small enough so that it can be moved about easily from room to room, thus making it available for students to examine closely and to use it for reference.

This visual aid is versatile. It can be used in architectural drafting classes as well as in a house-construction course.

The various members are exposed and easily distinguished. Their sizes in the model show their relative sizes.

This scale-model detail would also be of value to anyone contemplating building his own home. Considering the high cost of building in this day and age, it is not unlikely that more folks will be doing this in the future.—ARLEN HAUG. ●





For the Printer . . .

IF the beginning printing student has available to him a model lock up with all of the parts named, his comprehension and learning will increase. Associating a name with an actual implement further speeds up the process.

The type form (at left), furniture, reglets, and quoins are removable from the chase to show the position wide-measure and narrow-measure columns, full-page forms, and stationery headings should occupy. These positions are drawn on this visual aid with different colored inks.

All parts of this model are actual size and they are made from soft wood. On the background of this chase are the four main steps to be followed in the "Lock Up Chaser Method." Arrows (starting from upper left) point to each succeeding step.

The model should be mounted near the imposing stone.—WAYNE E. ANDERSON. ●

To Shed a Little Light . .

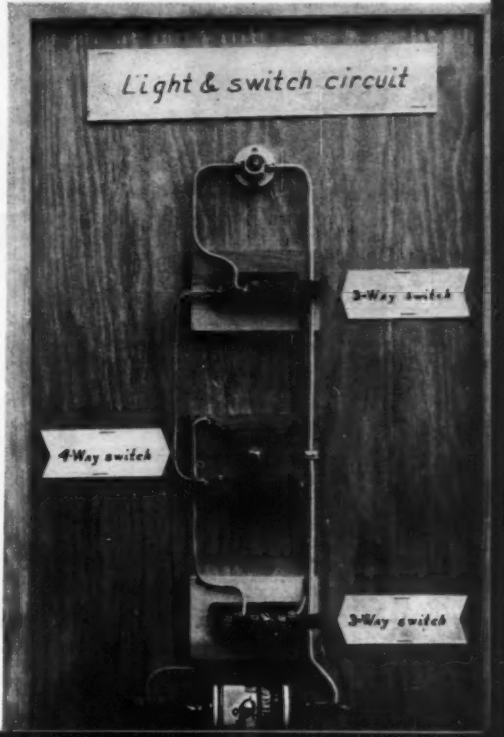
THIS visual aid (at right) is a light and switch circuit that can be used in an electricity class or laboratory. It will help the teacher explain electrical circuits of this nature and will supply effective transfer for the understanding of circuit diagrams.

The aid consists of two three-way switches, one four-way switch, bulb with bulb receptacle, #18 copper wire, and one dry cell for a source of power. The three-way switches are represented by single-pole, double-throw switches. The four-way switch is constructed with four copper-base contact terminals and a movable, clear-plastic plate with two copper contact bars attached.

It is constructed in such a way that tracing the path of the current through the switch is relatively simple. A power supply is provided so the instructor and students will not have to bother with the question of whether or not the circuit is complete.

The positive wires are colored while the negative wire is white, another aid to circuit tracing.

One look at this visual aid means a look at the whole system. This is a considerable advantage over going from floor to floor of a house, viewing just one section of the system at a time. It is also faster for demonstration purposes than drawing a circuit on a board. Its impact is greater, too.—GEORGE E. DESAUTEL. ●



A magazine rack will make a good woodworking project for those younger students who would like to make something a bit *sharp!*

For your junior-high shop students

A Magazine Rack— *It's Sharp!*

By Ben Graeff

Southern Junior-High School, Reading, Pennsylvania

THERE are probably very few industrial-arts teachers who have not had the challenge put to them by an eager junior-high shop student to make a project not like the ordinary, a project that has something "different" about it in terms of design. I faced one recently but rather than "different" my youngster wanted to make something "sharp." Specifically, he wanted to make a "sharp" magazine rack.

Webster uses thousands of words to define many and varied definitions of "sharp" but the youngster and I decided —or rather agreed—he meant a magazine holder that was not traditional in appearance. So, we conferred. We developed a magazine rack from these chats—and some serious work in the shop—that is not too difficult a project for any junior-high-school student. It is pictured above, and for your information—if you're looking for a "sharp" project for your students—we herewith submit some hints for making it.

These hints take the form of the series of photographs that form the U at the bottom of this page. Starting with Fig. 1 and going through Fig. 5: They show the jig for drilling holes for the rungs in the base, the jig in use, marking guidelines for drilling for the rails, drilling the rails, and affixing the end pieces.

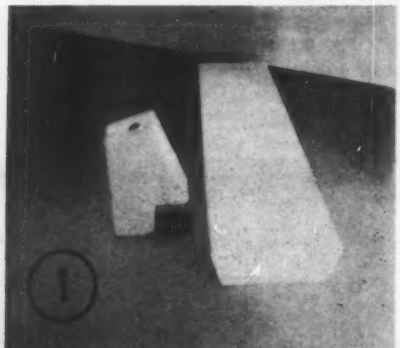
After sanding all parts thoroughly, glue the parts together. (We used a fast-setting plastic glue.) Next, from a piece of 4/4 maple, 6″ x 4″, saw—using a scroll saw—a pair of legs like those illustrated, or, perhaps, some that a student has designed. File and sand them to a pleasing and uniform shape.

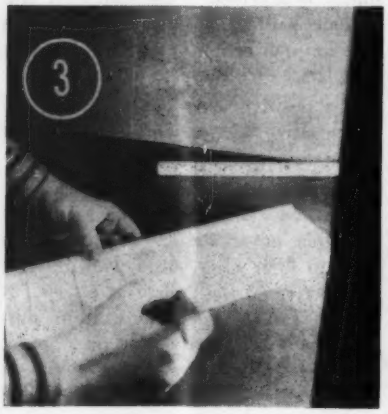
The best way we found to fasten the legs is to use a clamp. First bore two ½″ holes (Fig. 5) in each end of the magazine holder and glue a ½″ dowel in each of the holes to hold the legs. Each leg should have a ½″ hole in it to receive the dowel to hold the legs.

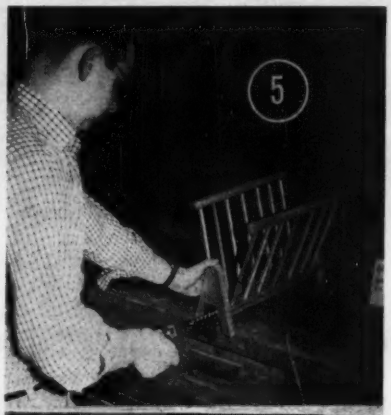
When the glue is set, remove the clamp, saw off the excess dowel, file, and sand smooth. We finished our job with one coat of lacquer sealer and two coats of satin varnish. The rack is finished, and we feel your students will agree that it is "sharp." ★

Bill of Materials

1 piece of 6/4 maple, 4″ x 15″
2 pieces of 4/4 maple, 6″ x 7″
14 pieces of ½″ maple dowel, 10″ long
2 pieces of 1″ maple dowel, 15″ long
4 short, ½″ maple dowels
Lacquer sanding sealer
Satin varnish







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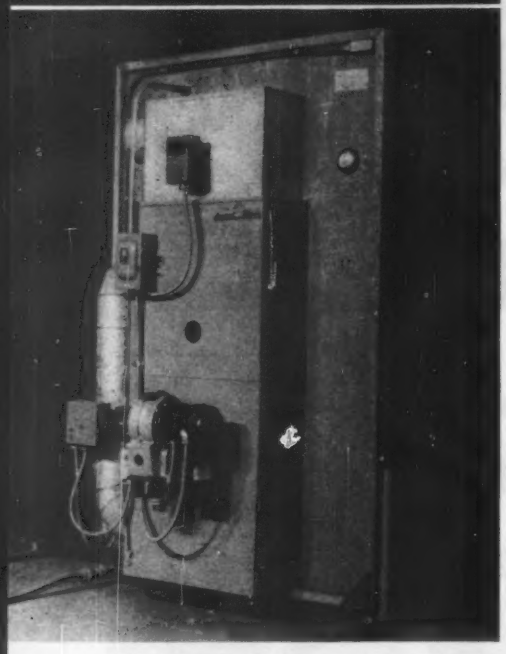


Top: Back view of burner mock-up showing the plenum heater, fan, and the control switches. Bottom: Side view of the entire burner mock-up.

Add another dimension to electricity class with this

Mock-Up Oil Furnace

By Earl Newton

Gerstmeyer Technical High School, Terre Haute, Indiana

DURING a visit with an electrical-contractor friend who serves as a member of my shop advisory committee, our conversation led to servicing of oil-burning furnaces. We agreed that in this area very few electricians had sufficient training in the technical operation of oil-burner controls. The training was mostly by "pick-up" and "hearsay," and service in many cases was performed by removing and replacing various units until the trouble was located. By canvasing several employers we found that a very limited number were training men or apprentices in this related field.

Obviously, a full-scale operating oil burner would be the best device through which to teach technicians. However, the danger of combustible materials and the safety factor prevent its use.

A second best approach, we decided, would be a mock-up that would be built and wired for operation just like the real thing.

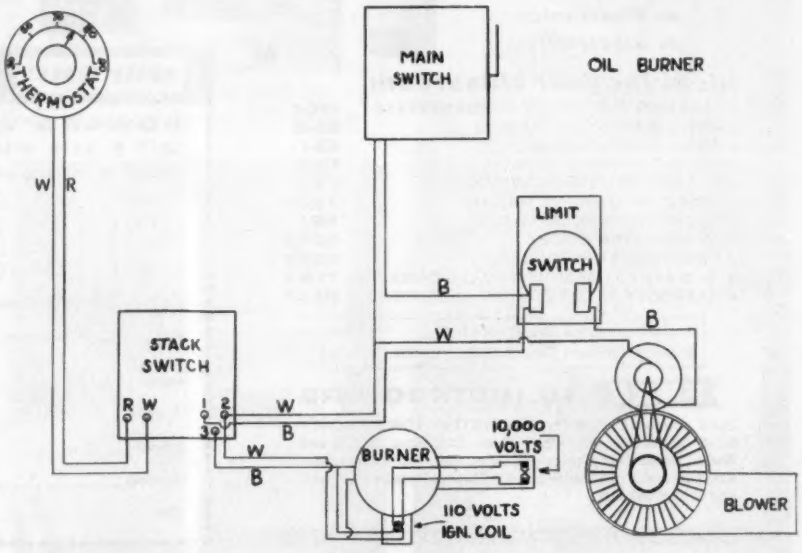
Since our laboratory funds were limited, we approached our local heating contractors for used material. One contractor, while listening to our pleas, suggested the furnace company he represented might be interested in our problem. The company proved its interest by supplying a new high-pressure burner complete with controls. The firm's only stipulations were that the material be used for educational purposes and that the trade name remain on the equipment.

From our departments and storerooms we assembled most of the following material: two sheets of 28-gage black iron, 30" x 96"; one sheet of 28-gage galvanized iron, 30" x 96"; 20 feet of ¼" x 1¼" angle iron; one gross metal screws; paint; ½" electrical metallic tubing; four single-pole toggle switches; No. 14 stranded wire of various colors; two 500-w heating elements; sockets; wall boxes; miscellaneous bolts, etc.

A ¼" x 4' x 6' fir plywood panel was framed with 2 x 4's in the wood shop. This panel was mounted on rigid conduit legs, using salvaged pipe fittings. It was then given two coats of varnish. The angle iron was cut and welded in the

Ten proposed job sheets are listed below:

1. Wiring the burner. Local and National codes.
2. Checking operation of burner.
3. Burner starts and stops in short intervals.
4. Blower motor failure.
5. Burner motor failure.
6. Thermostat calibration.
7. Oil-burner ignition.
8. Burner controls and safeties.
9. Internal wiring of controls.
10. Safety lockouts.



welding shop to form a mount for the burner. This mount, when bolted in place, formed a rigid support, free of sag when the burner was in place. Over the angle-iron mount was placed a cover of black iron made to resemble an 8" section of the front of an oil burner. This was complete with plenum chamber, warm-air thimble, and smoke pipe.

When the protectorelay and combination fan and limit switch were mounted in their respective locations, provisions were made for wiring in the 500-w heating elements which would simulate the heat created from burning oil. An 8" fan, salvaged and rebuilt in the shop, was used as the blower. This was placed in the plenum so that air would be blown from the warm-air thimble.

Since the pump would not be pumping fuel oil, a need for lubrication developed. This was arranged for by filling the pump with number 10-W lubricating oil and then backing out the pressure-control valve.

All exterior wiring, including the thermostat, was made in electrical metallic tubing and flexible steel conduit according to National Electric Code specifications. Single-pole toggle switches, which operated from the back of the panel, were wired to control each heating unit, the pilot light, the fan, and the burner motor.

By turning off the power to either of the heaters, or to the other units, various conditions, which resembled troubles found in actual, everyday experience, could be created.

From both a practical and a teaching standpoint, it has been found that two boys or men, working as a team, form the best method for trouble shooting. They, of course, must be experienced in the exact methods of furnace wiring. To gain this experience, one team strips the wiring from the furnace and the next team rewires the job.

Where possible, all connections are made with wire nuts and friction tape. Friction tape is preferred to plastic tape because of the ease in untaping joints in trouble shooting.

Without a doubt, a lot can be taught by using a teaching aid of this or similar design. Wiring and operation follow closely that of high-pressure, gun-type burners. From the standpoint of circuitry, my professional advisors have been quite satisfied with the results.

Perhaps one of the best handbooks available for use with a teaching aid of this kind is a book published by Minneapolis Honeywell Company titled *Handbook for the Installer and Service Manual.* ★

A sample trouble-shooting lesson may be presented as follows: Instructor opens circuit to stack switch or protectorelay heater.

Lesson 10

SAFETY LOCKOUTS

BURNER STARTS BUT LOCKS OUT AND WILL NOT CONTINUE TO RUN.

Things to do:

Steps (See Figure 1)

1. See that thermostat calls for heat.
2. Reset safety button in protectorelay.
3. Make sure that contacts are in step in protectorelay.
4. Set limit switch to highest setting.
5. Examine to see that hot contacts are open and cold contacts are closed.
6. After starting burner again, make sure that drive shaft in protectorelay moves out as burner continues to operate.
7. Be sure that smoke pipe warms up when burner is in operation.
8. Check for fire in combustion chamber. (Indicated by pilot light.)

TROUBLE COULD COME FROM ONE OF THE FOLLOWING.

Make your selection of the cause of trouble and tell why burner operates in this manner.

1. Thermostat not calibrated properly.
2. Limit switch set too low.
3. Oil supply to combustion chamber not sufficient.
4. Heat in smoke pipe not sufficient to activate relay.

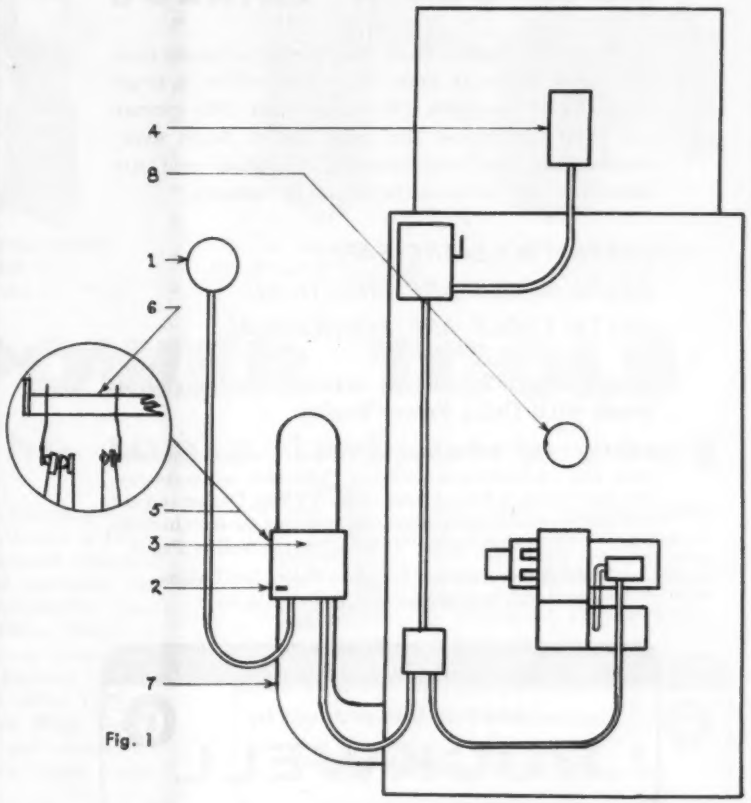


Fig. 1

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It's still English

"Tough" Means "Cool" and "Gone"

By Earl M. Weber
Ohio University, Athens, Ohio

BOY, that's tough," exclaimed one of the boys in a graphic-arts class as he watched a classmate pull the first proof from a linoleum block. The instructor was surprised by the remark for the print really was quite good. His confusion was cleared up when the youngster revealed that "tough" means "cool" or "real gone."

This incident illustrates the lack of communication that often exists between teacher and pupil. Not that I want to infer that I am either encouraging or condemning the jargon of today's teenage youngsters. The fact is that skill in the art of communicating is one of the areas of learning that concerns all teachers. Shop teachers, as well as other instructors, perhaps are remiss in meeting this responsibility.

And this means much more than simply insisting on the use of correct grammar, although this, too, is important. One drafting teacher came face to face with this latter need when a boy in his class announced at the beginning of the session, "I ain't got no 4H pencil." When asked to repeat his question, he tried, "I don't got a 4H pencil." A plea for another attempt resulted in, "What's the matter, ain't we got nothin' but English teachers around here?"

There are, however, deeper implications for the teacher of industrial education, and these, perhaps, are equally as important as the correct and proper use of grammar. One is the use of precision in speech. The ability to say exactly what one means with little or no chance of misunderstanding is a skill well worth developing. It is one of the abilities that is looked for in supervisors and foremen in industry.

Obviously, then, it becomes important to know the correct names for tools, machines, parts, and materials. A boy

(*Continued on page* 23)

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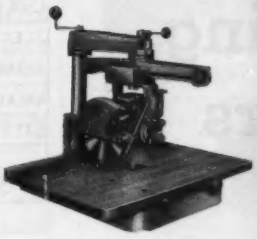

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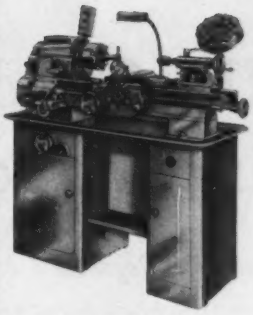

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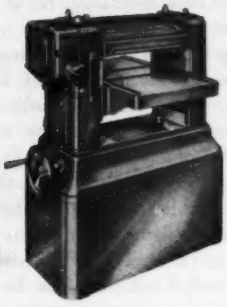

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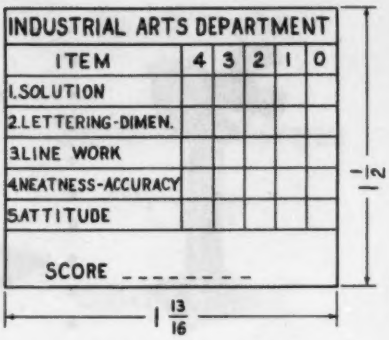
Here's a system that can help

Speed Up Grading Drawing Papers

By Carlyle E. Ragsdale

Alexander Hamilton Junior-High School, Seattle, Washington

THE numbers of mechanical-drawing plates to be checked and graded by the drawing teacher can often reach voluminous proportions. Faced with the task of grading drawings almost every day, one tends to become careless and even lazy. When a teacher is not at his best and allows his grading of pupils' work to become mediocre, he is doing an injustice to them.



A stamp for grading drawings has been devised as an aid for both teacher and pupil. If he has a definite guide for checking each paper, the teacher can do a more consistent and fair job of grading. On the other hand, the student will be able to pin-point the areas in which he needs to improve.

The stamp (above) has on it five items to be checked. Each item can be rated from *A* to *E* if a numerical rating is undesirable. The first four items are of an objective nature and the last item—attitude—allows for a subjective rating of the pupil. The items on the stamp are as follows:

1. **Solution:** (1) placement of the drawing or sketch on the paper; (2) proper representation of the views; (3) correct placement of and types of lines; (4) proper layout of margins and information strip.

2. **Lettering-Dimensioning:** (1) proper forming and spacing of letters and numbers; (2) clear and precise notes and other information; (3) use of guide lines if required; (4) required dimensioning techniques followed to include extension lines, dimension lines, arrow heads, and placement of dimensions and notes.

3. **Line Work:** (1) proper application of the alphabet of lines; (2) lines of even weight, sharp, and clear; (3) corners and tangents converge without overlapping; (4) proper use of instruments and pencils.

4. **Neatness-Accuracy:** (1) general appearance of the drawing such as cleanliness, balance, and sharpness; (2) accurate plate and object layouts; (3) correct size measurements.

5. **Attitude:** Attitude can be defined, to the class, by the teacher. Because attitude is such an elusive educational term, the teacher should set the standards of conduct and workmanship he expects of the pupils. For this purpose it is felt that attitude should at least include the pupil's conduct in class, his efforts to improve his work, and his sincerity.

A great part of the chore of figuring of term grades can be done by the students. They can total up their point scores and report the scores to the teacher. If a record card is kept, the

(*Continued on page* 24)

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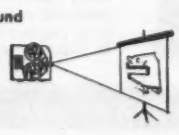

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Communicating . . *from page 20*

in the school shop should know machine screws, lag bolts, try squares, spanner wrenches, toggle bolts, RHB, S2S, and a myriad of others. Standard sizes, weights, colors, and symbols should become a part of his vocabulary.

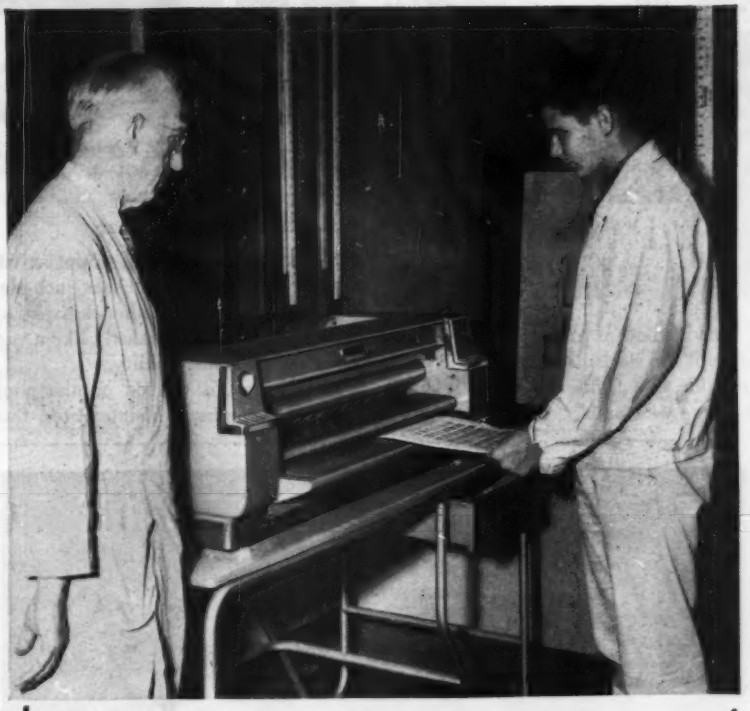
Precision in speech further implies the correct usage of such words as "square," "plumb," "flat," "smooth," "straight," "level," and similar terms. These may seem elementary, but consider the word "square" from the viewpoint of a seventh-grade boy. In arithmetic class he knows this word as a geometric figure; he also knows what a square dance is; he refers to the center of town as the town square; and he has heard of getting a square deal; and he no doubt thinks of his teacher as a bit of a square. Can it be assumed that we are clearly communicating when we ask him to square that board?

We devote a good deal of thought and planning to instill safe, efficient, and orderly shop habits. It is merely being consistent in this kind of orderly and well planned atmosphere to discourage careless and slovenly habits of speech. It would seem to be a worthwhile endeavor to strive for the same kind of close tolerances in correct and precise speech as we think are desirable in good machine-shop practice.

There is another area in this matter of effective communication that should be mentioned. It is the difference between the way the world of industry writes and talks, and the school way—*and there is a difference.* In most cases a job report written by an engineer and a theme written for an English class bear little resemblance to each other. There are many unexplored possibilities for the alert teacher of industrial education to adapt plan sheets, bills of materials, job sheets, progress reports, time sheets, and other reports used in the industrial world to his school-shop program.

In this connection, it should be pointed out that there are many terms so commonly used in the various trades that they might well become a part of the school-shop vocabulary. This is not compromising our stand for correct speech; it is merely essential for accurate communication and complete understanding. A boy in the school shop should know that when a plasterer says *mud,* he refers to mortar and that a *hot* wire has very little to do with temperature.

Perhaps our answer to the lad who asked, "Ain't we got nothin' but English teachers around here?" should be, "That's right, we ain't." ★



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You owe it to yourself and your students to investigate the remarkable Copyflex "300". It offers all the versatility and big printing width of a large, expensive diazotype reproduction machine—at a price to fit school budgets. Moreover, the "300" can be utilized for fast, labor-saving reproduction of student transcripts and a wide variety of records, reports, charts, and memoranda. Why not mail the coupon right now for more information?

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Speed Up . . . . . *from page 22*

pupils can record their own scores. Score limits for letter grades can be ascertained by the teacher. If letter grades are given for each drawing, the following point breakdown has proven to be practical:

Points	Grade
18 to 20	*A*
14 to 17	*B*
7 to 13	*C*
3 to 6	*D*
0 to 2	*E*

This method of grading is very popular with the students because it is more equitable, and as one boy said, "It shows us where we stand." ★

KINKS

Payment will be made for each Kink published. Send to Editor, School Shop, Ann Arbor, Mich.

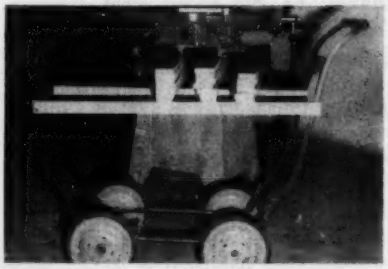
To Make It Sharper

Aluminum can be used to put an edge on fine cutting tools such as jack-plane blades, sloyd and leather knives, and carving tools. It acts exactly like a razor hone of the finest quality.

When steel is rubbed on the aluminum, the aluminum disintegrates, forming a minute powder of greasy quality that clings to the steel and assists in cutting away the surface of the harder metal. A piece of sheet aluminum cemented to a block of wood makes an effective, inexpensive hone. — *Louis Enos, Lincoln Junior-High School, Sacramento, Calif.*

Throw Out the Baby

To move mass-produced items from one machine to another in our shop, we reconverted an old baby buggy frame into a carrier, as shown in the photograph below.



A solid platform or box can be used on the carrier to hold small parts.— *Robert S. Tupper, Canton, S. D., High School.*

Sanding Boards for Plastics

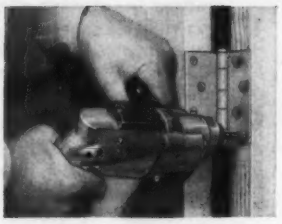
When sanding the edges of projects made from plastic, one of the easiest ways to get a true straight edge is to work on a sanding board. These are pieces of ⅛" hardboard to which a full-size sheet of sandpaper has been glued. Use a variety of grades of sandpaper and try a sheet or two of emery cloth, also. Build a simple box to hold the boards as shown in the photograph. You will find it easier for you and your students to keep the boards in their proper place.—*Bob Reeves, Chula Vista Calif., Junior-High School.*

Homemade Layout Fluid

Tear up hectograph carbon and place the pieces in a tin can. Add as much alcohol as you wish to make layout fluid, stir, and drain off the alcohol in a suitable container. Add approximately 10 to 15 percent shellac and you now have a purple, quick-drying layout fluid. When the liquid thickens, add alcohol. We've found an old shoe-polish bottle—

NOW IT'S A DRIVER!

Slip a bit into the quick-change chuck and this powerful new tool is a rugged, easy-to-use screwdriver. Handles the complete range of driving jobs from heavy duty to delicate precision fastenings. 275 RPM gearing provides extremely high torque — permits positive control for free-hand driving. Safety switch eliminates accidental reversing.



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with the original swab—more than adequate for a container.—*James E. Bowman, Central Michigan College, Mt. Pleasant.*

Die Work by Band Saw

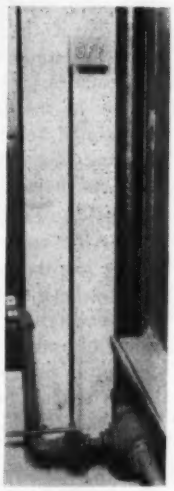
Sometimes a printing job that calls for a steel-rule die can be accomplished in another way—on a band saw without the use of a die.

Set up the job in type to fit the shape of the finished form desired, print, fold if necessary, then nail the printed form to a piece of plywood. Put two nails in the largest scrap area so the stock will not twist. Then cut on the band saw as you would a piece of wood, saving the piece with the two nails for the last.

Invitations, programs, posters, shapes for table decorations, etc., can be cut in this manner.—*Bernard J. Vesely, Industrial Education Department, High School, Whiting, Ind.*

Tell-Tale Flag

The gas valve shown at the bottom of the photo at right is hidden behind the furnace in our shop and cannot be seen except from this angle. Before the tell-tale flag at the top was installed on the valve, it was necessary to make a special trip to the far end of the shop to check to see if the valve was closed when securing for the night. Sometimes this was overlooked. Not only was it annoying to have the shop filled with the odor of gas in the morning, but it was dangerous as well. When the valve is turned off, the flag can be seen from anywhere in the shop. It is painted red with gold decal letters.



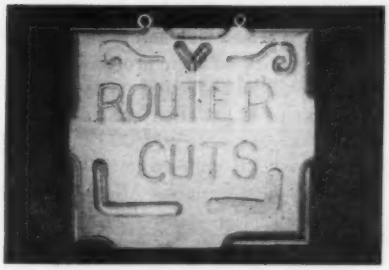
Another flag at 90° to the "Off" flag reads "On." These flags have just about removed our problem of the gas valve being left on in our shop.—*Carl H. Hubachek, Branford, Conn., High School.*

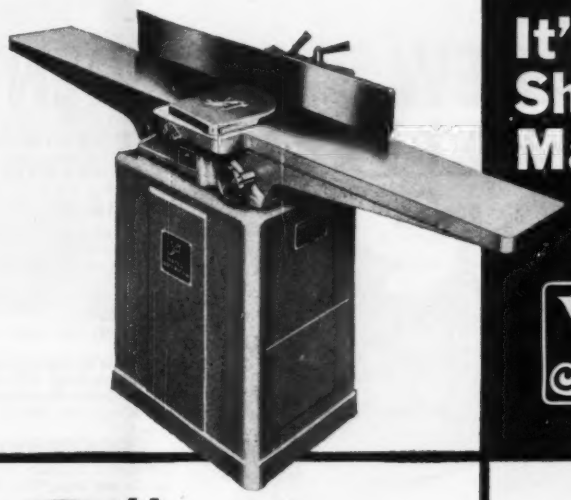
To Delay Setting

Here's a "trick of the trade" told to me by an old, experienced plumber: When you need to lengthen the time before small batches of plaster of Paris finally sets up, use white vinegar instead of water in the mixture.—*Stan Schirmacher, Papago School, Phoenix, Ariz.*

Self-Explanatory

To save wear and tear on the vocal chords, in our shop we use the board at right picturing cuts made by each of our router bits. This scheme not only makes it unnecessary to describe each bit but also eliminates much doubt students may have about what the finished cut will look like.—*Russell D. Osterhout, Monte Vista School, Phoenix, Ariz.* ★





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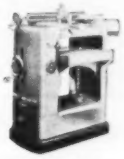
SURFACER

Knowledge . . . . *from page 8*

even so anxious for this that they are willing to come in before and after school to work on their projects. I wonder if they'd be as anxious to see movies or filmstrips or get other related instruction? Yet—in college they taught us that related instruction is even more important than shopwork. And I believed them. Yet when I think of it, almost *any* teacher could teach that part of it—in an ordinary classroom, too. We could then say that "every teacher is an industrial-arts teacher," couldn't we? And we could get along with much less money than we now spend on supplies and equipment. No. That wouldn't work. Our "stock in trade" is still manipulative work. If we take *that* out of industrial arts, we have no unique contribution to make to the education of our students.

Unique. That's what industrial arts is. That's why it is taught in schools. Isn't that why each of the subjects which we have in schools is there? English? History? Science? Arts? Music? Each of these has its own peculiar contribution to make. Otherwise it would really serve no purpose. Just like foods. "The Basic Seven." We need *all* of them. Each contributes something that the others don't. They all work as a team to nourish and build the body. Some are rich in protein, others in carbohydrates, others in vitamins, and so on. That's why we try to eat some of each, and that's why we teach many areas of skill and knowledge instead of one. That's why, too, teachers specialize in certain areas but are exposed to others in order to receive a broad, general education. Industrial-arts teachers must take history, chemistry, physics, English, art, music, and all the rest. That's why we say that teachers are *educated*, not *trained*.

Similarly, our students should be *educated* by sampling each of the subjects offered. That's why that old-timer was puzzled when I answered him as I did. That's why he asked what I was *hired to teach*. Of course, all of us teachers are interested in teaching students—to make them good citizens—but we can do this only when we specialize in something. Citizenship cannot be taught in a vacuum. A filling station sells tires, oil, gasoline, cleaning and polishing materials, and even cold drinks. Other stores sell many of these items, but when you need gasoline you don't go to a grocery or department store—you go to the *gas station*. Same way with a drug store. They sell many items that other stores sell — even lunches—but when you have a prescription to be filled, you go to the drug store. No other store can do this for you. So if the industrial-arts teacher helps the student with his English or mathematics, or anything else, for that matter, he is performing an *auxiliary* educational service, a concomitant, so to speak, not what he is really *hired* to teach, as the old-timer said.

That's it. Each subject has its unique or specific contribution to make. But it also has the general or concomitant. It takes both to do a truly good job of educating. The unique function, and prime objective, of industrial arts is to develop in each student a degree of skill in the use of the common tools, materials, and machines. No other subject can do this. All other objectives for our area of education are auxiliary or concomitant. We cannot "sell" or justify ourselves on the basis of those objectives which are not unique to our work any more than we can justify a drugstore on the basis that it sells ice-cream cones. That is exactly why the old-timer was puzzled. That's why he asked what I was hired to teach.

The related information which we teach in our class is either *technical* or *auxiliary*. The technical is what a stu-

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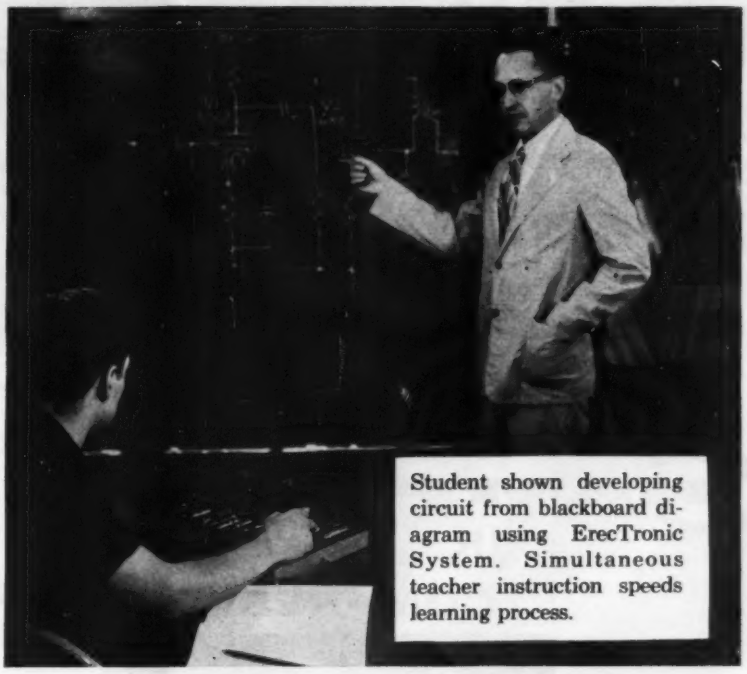

Student shown developing circuit from blackboard diagram using ErecTronic System. Simultaneous teacher instruction speeds learning process.

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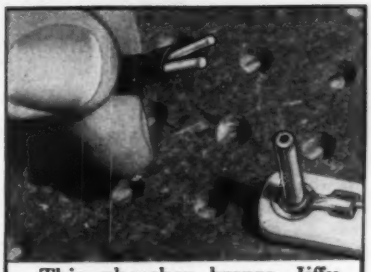

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dent *must* know in order to use tools and machines effectively. The auxiliary is what a student *may* know but does not need to know. It is the kind of information that can be taught in an ordinary classroom, not necessarily in a shop—and not necessarily by an industrial-arts teacher. How can we justify industrial arts on that basis?

Good citizenship is the universal goal of all of our schools and of all the subject-matter area. No one area can accomplish this goal by itself. It takes all of us, working as a team. We buttress and complement each other. Many of our concomitants overlap each other, which is as it should be, as long as our specific contributions remain unique. Yes. We can develop our students into well-educated citizens. We must, however, include such ingredients as sympathetic understanding, loving care and concern, and a thorough grounding in the fundamentals of our own work—that which we were hired to teach. What we *call* it does not matter; what we *do* with it is very important. Even the old-timer would understand something as fundamental as that!

Mr. Johnson slept very soundly and peacefully for the remainder of the night. ★

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Operation "Industrial Education"

Operational activities of the industrial-education department of the University of Maryland, College Park, recently have included a Prospective Industrial Arts Teacher Day on Campus; a 55-minute, sound motion picture, "Career Decision," aimed at recruiting teachers; and the production of display and other material aimed at directing young people into industrial-arts teaching.

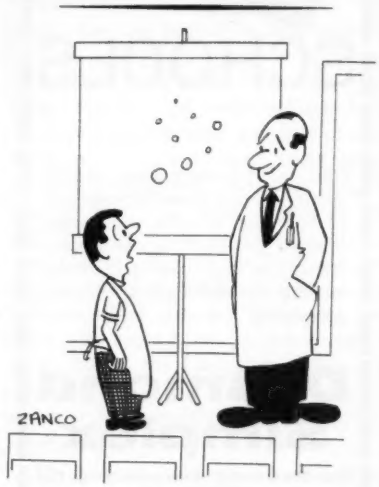
A scholarship award by the Nu Chapter of Iota Lambda Sigma of $250 each year is also used to encourage students to enter the field.

These activities complement research activities in the area of recruiting teachers.

It "Made" the School Paper

Industrial-arts activity in the Ashboro, North Carolina, High School is reported each week in the school newspaper, *Ash-Hi-Chat*.

A column, "Shop Talk," is written by student reporters who are in the classes. Some excerpts follow: ". . . we received our material and were permitted to work in the shop. We didn't accomplish much the first day, but the second day was quite different." And, another: "For a few boys it was easy to make something from wood, but to others it was the challenge of their lives. The boys have all become serious about their work and are enjoying it as it is more of a pleasure than work."



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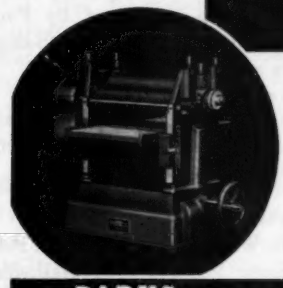

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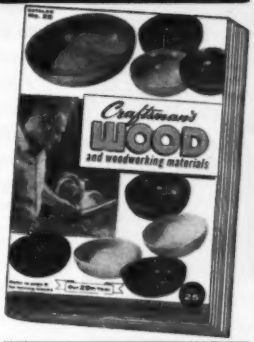

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The new course is flexible to purchase and to use. Each unit is self-contained yet may be combined for various length courses. All 10 are adaptable for short or one-semester courses. Units can be easily used for either the unit or general shop plan teaching.

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William A. Kavanaugh, B.S., M.S. PhD

Assistant Professor of Electricity—Radio Electronics, University of Minnesota

Dr. Kavanaugh's education in the field of Electricity, Radar, Electronics and related sciences has spanned nearly a quarter of a century. He has been a distinguished teacher of high school, college and adult classes for fourteen years. His contributions to the teaching profession have long been admired, and his abilities have earned him nationwide prominence in the Industrial Arts field.

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happenings in industrial education

Industrial-Arts Conference

MEETING for the 45th time, the Mississippi Valley Industrial Arts Conference convened at Chicago, November 13-15, to discuss, if not to solve, some of the current problems in industrial-arts education. Topics covered by the nearly 60 members in attendance, from nearly as many colleges and universities, included "What Will Be the Major Developments in Industrial Arts Education in the Next Ten Years?," "New Curriculum Patterns for the Preparation of Industrial-Arts Teachers," "How Important Is It in 1958 Whether We Call Industrial Arts General Education or Vocational Education?," "How Can a Program of Student Teaching Be Improved?," and "Characteristics of a Technological Society Which Should Be Reflected in a Program of Industrial Arts."

New members taken into the conference were Orin R. Robinson, state supervisor of industrial arts, Frankfort, Ky.; E. L. Barnhart, Kansas State Teachers College, Emporia; Harold Porter, Kansas State Teachers College, Pittsburg; Ira H. Johnson, Mankato, Minn., State College; and Dempsey E. Reid, Western Illinois University, Macomb.

Safety Winner

THE auto-shop class at Harding High School, Warren, Ohio, has been honored as the best teen-age group in the U.S. in supporting a safety-check program. The class has received the National Circle of Safety Award from *Look* magazine and the Inter-Industry Committee of the National Safety Council.

Members of the class, a unit of the local chapter of the Vocational Industrial Club of Ohio, assisted in the safety-check campaign by working in the check lanes. They were supervised by Paul Pritchard and John Wolfe, auto-shop instructors and sponsors of the club.

The award was made in October at a dinner in Warren at which Ned Dearborn, president of the National Safety Council, was principal speaker.

Connecticut Group Meets

HAROLD R. W. BENJAMIN of George Peabody College for Teachers, Nashville, Tenn., was the principal speaker at the fall convention of the Connecticut Industrial Arts Association, held Oct. 24 in Bridgeport. He spoke on "Key Education Issues—A Comparative View."

Plans were made for the annual spring conference of the association, to be held May 1-2 at the Teachers College of Connecticut, New Britain. Co-chairman of the conference will be Nicholas Battit, West Hartford, and Robert Bateson, Teachers College of Connecticut.

The Navy Loses

RESULTS of an experiment last summer in which nine junior-high-school students were enrolled in the basic electricians mate school at the U.S. Naval Training Center in San Diego, Calif., have been announced in a recent issue of the *California Industrial Education Association News*.

The nine students from San Diego City Unified School District, who took the six-week electricity course last summer, were enrolled with nine navy students, selected from a typical group who qualified through the navy testing program. On completion of the course, the test scores were compared. The junior-high students' average score was 92.1. The navy students' average score was 86.5. Three of the junior-high students ranked highest in the entire class.

The purposes of the experiment were: to observe the navy's method of instruction, to determine whether this method of training could be used in public

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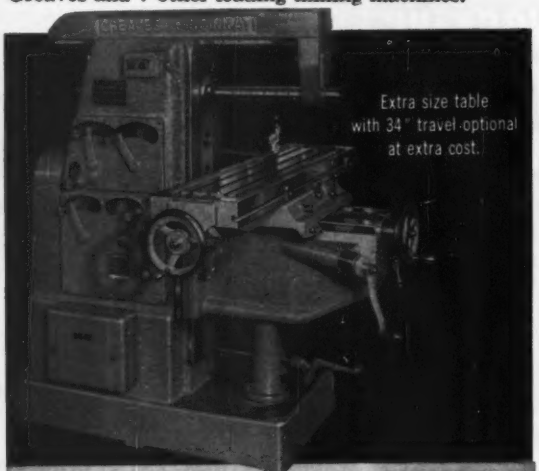

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secondary schools, and to discover how students react to the navy type of concentrated education.

Richard Turney, San Diego industrial-arts instructor, observed the class and made an evaluation. George V. Hall, assistant superintendent in charge of instruction, and William B. Steinberg, supervisor of industrial-arts education, assisted in arrangements for the experimental class.

West Virginia Meeting

A TALK by Stanley J. Pawelek, supervisor of industrial arts at Baltimore, Md., was one of the highlights at the annual fall meeting of the West Virginia Industrial Arts Association, Oct. 17-18, at Fairmont State College. William E. Warner of Ohio State University shared the spotlight with Mr. Pawelek, speaking at both the convocation and at the Epsilon Pi Tau dinner.

AVA Committee Named

THE American Vocational Association has announced that its Committee on Public Information is now organized and is ready to carry out its function of providing the public with the information it will need in making critical local, state, and national decisions about vocational and practical-arts education in public schools during the next few years.

Members of the committee are: Melvin Barlow, University of California, Los Angeles; Pauline W. Burbrink, University of Texas; Howard A. Campion, Los Angeles, Calif.; Charles E. Cooper, Missouri State Department of Education; Martha Creighton, Virginia Polytechnic Institute; Thomas Diamond, SCHOOL SHOP magazine; E. D. Goldman, San Francisco, Calif.; J. F. Ingram, Alabama State Department of Education; J. B. Kirkland, North Carolina State College; Jarrot A. Lindsey, Jr., Georgia State Department of Education; James H. Pearson, U.S. Office of Education; Thomas A. Van Sant, Baltimore, Md., Arthur Walker, Virginia State Department of Education; M. D. Mobley, AVA executive secretary; H. M. Hamlin, University of Illinois.

Consultants to the committee are James B. Conant, director of A Study of the American High School; Elaine Exton, *American School Board Journal;* Philip J. Hickey, superintendent at St. Louis, Mo.; and Dean M. Schweickard, Minnesota Commissioner of Education.

New Industrial Course

THE new industrial-education curriculum at Southern Illinois University, Carbondale, is said to be a new concept in preparing industrial-vocational teachers. The program consists of two optional courses of study.

A five-year cooperative program leading to a bachelor of science in education degree is one of the optional courses. In this course of study, students will first complete a two-year college-level vocational-technical training program. Then they will spend two additional years in campus classes and one year, including summer terms, in supervised internship in industry.

The other option is designed to qualify persons with trade experience for becoming vocational-industrial teachers in high schools by completing a regular university teacher-training course of study.★

Convention Calendar

California Industrial Education Association, Civic Memorial Auditorium, Stockton, Mar. 13-14.

Illinois Vocational Association, Hotel Pere Marquette, Peoria, Mar. 19-21.

Ohio Industrial Arts Association, Neil House, Columbus, Mar. 19-21.

New Jersey Vocational and Arts Association, Asbury Park, Mar. 19-21.

Michigan Industrial Education Society, Pantlind Hotel, Grand Rapids, April 9-11.

West Virginia Vocational Association, Jackson's Mill, April 17-18.

American Industrial Arts Association, Long Beach, Calif., April 22-26.

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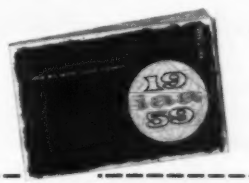

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Diamond Dust

Abrasive comments from that doughty Scot, Tom Diamond, former head, Department of Vocational Education, University of Michigan, Ann Arbor.

Camouflage

BILL had just been elevated to the position of department head for industrial arts in Podunk Junior-High School. The day before school opened in September he called his staff together for the purpose of discussing a problem which, to him, was of primary importance.

Apparently the first project in the beginning class was intended to provide the pupils with experience in using a plane. This seemed appropriate, but, as department head, he was concerned about the most effective method of concealing the fact that the project was merely an exercise. He felt that it must be dignified by a name, which would impress on the pupils that they were working on a project which would be useful in the home, in the shop, or in the school.

When he presented the problem to his teachers, the response was quite gratifying. From the many suggestions made, it was finally decided that a suitable title might be "A Breadboard." The second choice was "A Meat-Chopping Board." The vote on these two titles was almost even, so it was agreed that the first choice would be used during the first semester, while the second choice would be used during the second semester. The two articles produced during the year would be identical—with generous limitations on the dimensions—but, paradoxical though it may appear, they would be different.

We hear frequent derisive comments on the time-honored broomholder and coathanger but, in their day, they were just as respectable as the articles mentioned above. The teachers who introduced these atrocities were equally as sincere in their efforts to provide their pupils with learning experiences as the teachers of today. They felt, just as the present-day teachers do, that practice in any skill must be provided, but that it was imperative that the learner be deceived into the belief that he was not practicing—he was making something of commercial value.

But what is wrong with practice? If you wish to do something skillfully you must practice, and keep on practicing. What about the pianist or the typist? When starting the process of learning to play a piano the pianist practices exercises and scales, and he keeps on with these for a considerable time before he attempts to render a formal piece of music. Similarly, the typist begins by learning the location of the characters. From this he proceeds to typing "A quick brown fox, etc., etc." In both of these cases, considerable practice is done before any attempt is made to produce a finished article.

In the field of sports, too, football, golf, baseball, and tennis players spend hours practicing, all to the end that they develop skill and knowledge which will improve their ability to play the game. And no one attempts to conceal the fact that it is practice.

Even in school activities we find that practice is used to develop skill in the manipulation of figures. Hours and hours are expended on drill in order that the pupils may become efficient in the application of arithmetical principles. And, when we consider the area of industrial arts, it is interesting to note that the teacher of drafting attempts to train pupils in using the language of lines by assigning exercises, and he makes no apology for it. He

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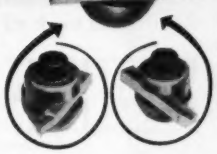

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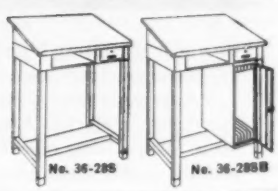

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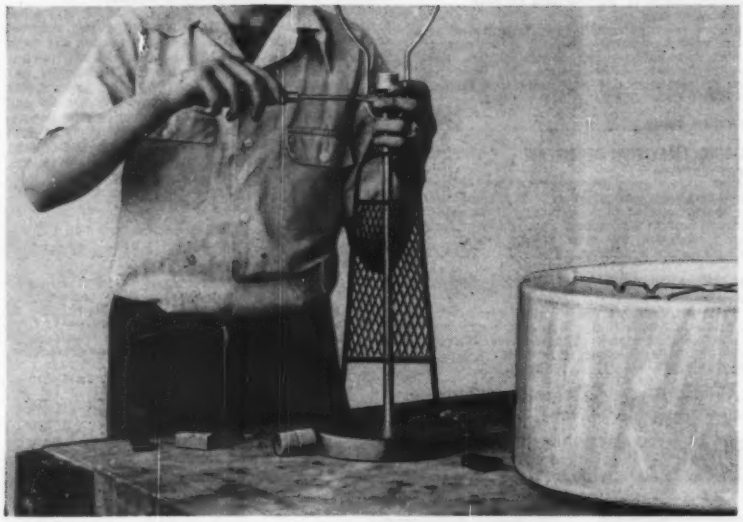

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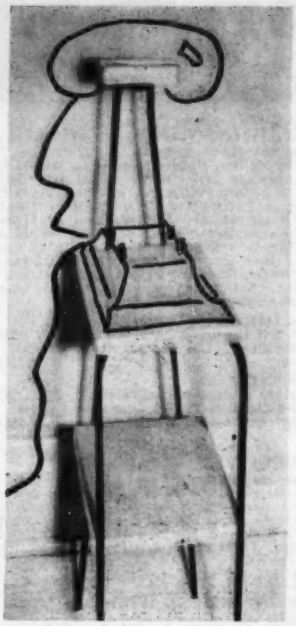

The finished stand showing an "open" telephone (outlined in black) resting on the stand and waiting for something to pick it up.

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By M. L. Zanco

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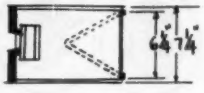

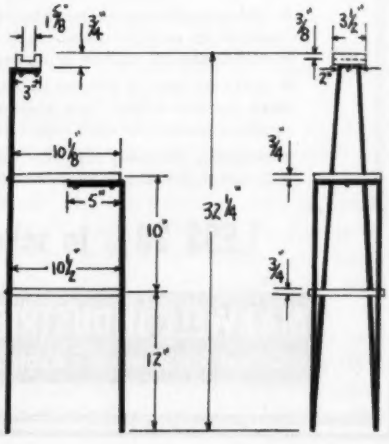

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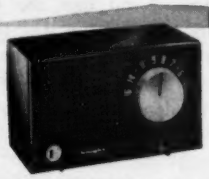

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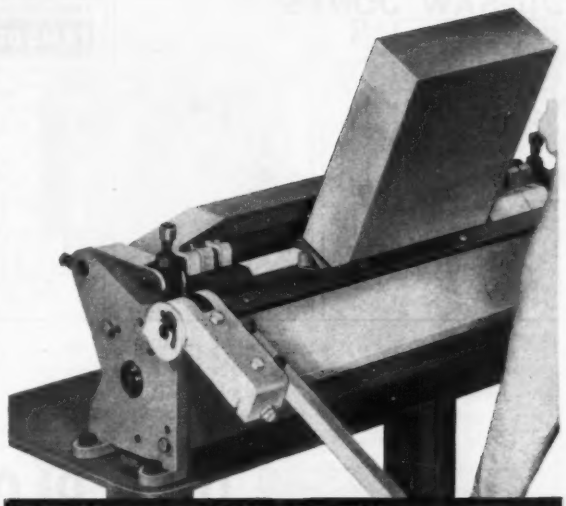

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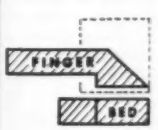

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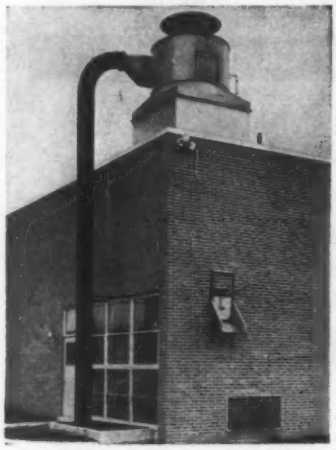

Photo above shows collector on shop roof and scrap discharge door in side of building. This unique system at the Carlisle Senior High School, Carlisle, Pa., accommodates all dust and scrap from the shop shown at right. All piping is below floor level under grating to best utilize all available working space, and to give the students maximum visibility and freedom of movement around machines.

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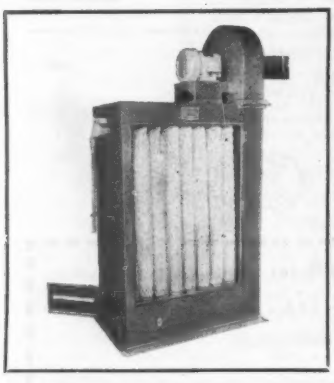

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October 17 was a sad date for the industrial-education profession. On that date two leaders in the field died of heart attacks — ROBERT LONG THOMPSON, chairman of the department of vocational education at New York University School of Education, and FRED J. SCHMIDT, JR., head of the industrial-arts department at Ball State Teachers College, Muncie, Ind. Dr. Thompson, who was 50, had been head of his department since 1954. Dr. Schmidt, a past president of the American Industrial Arts Association, became head of the department at Ball State in 1947. In his honor, Ball State Teachers College Foundation has established the Fred J. Schmidt, Jr., Memorial Scholarship Fund. Contributions may be made through the Development Office, Ball State Teachers College.

LOUIS G. CLARK, formerly cooperative-education coordinator and adult-education director of Sikeston, Mo., High School, is now administrative assistant at the David Ranken, Jr., School of Mechanical Trades, St. Louis.

CLAUDE HOWARD, formerly coordinator of trade and industrial education at the Harlan County Area Vocational School, Ky., has been named director of the Lafayette Area Vocational School, Ky., succeeding BERNARD T. FAGAN, now teacher-trainer of industrial education at the University of Kentucky, Lexington.

DEMPSEY E. REID has been named chairman of the industrial-arts department at Western Illinois University, Macomb, succeeding WAYNE WETZEL, retired. New staff members are FRED ZIMMERMAN, CHARLES MELINE, and VERNER JOHNSON.

H. G. PALMER, professor of industrial arts at Iowa State Teachers College and head of the department from 1948 to 1954, died Oct. 22, at the age of 61.

DONALD INGRAHAM is the new supervisor of industrial arts and vocational education for Arlington County Schools. Va., succeeding DON PETERS, now a member of the faculty at the College for Teachers, Buffalo, N.Y.

MYERS EGGERT has been named supervisor of practical arts and vocational education at Poplar Bluff, Mo, succeeding DAVID BERRYMAN, now director of vocational education at Springfield, Mo.

B. C. TINNELL is head of the industrial-arts department at Appalachian State Teachers College, Boone, N.C. ★

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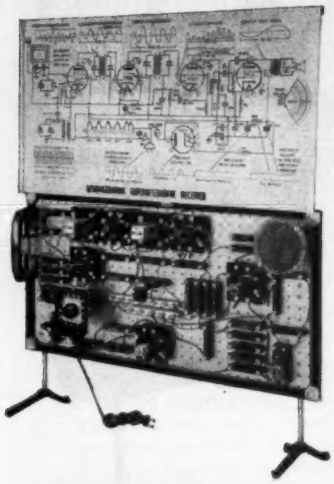

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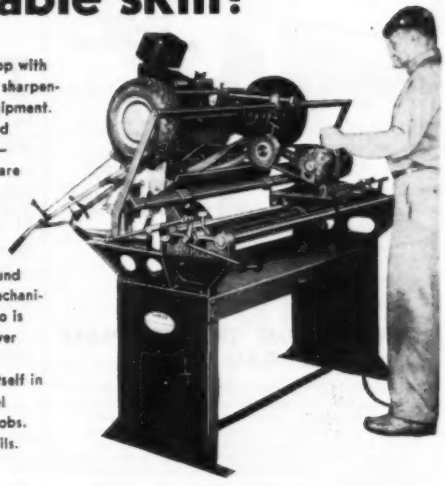

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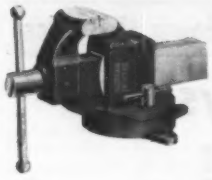

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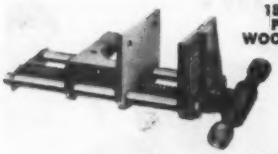

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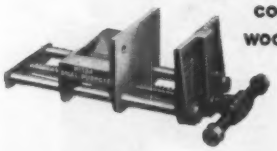

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Project Design

What the industrial designers are doing (One of a series)

INDOOR-OUTDOOR CHAIR

Designer: Charles Eames
Manufacturer: Herman Miller Furniture Company, Zeeland, Michigan

THOSE readers who are familiar with the work of Charles Eames will not be surprised by the fact that Eames' latest (1958) chair is entirely different in concept from his previous design solutions. Following his post-World War II plywood chair of revolutionary design, he capitalized on other new materials and processes to develop his plastic and wire chairs.

Here is the latest of the Eames chairs made of anodized cast aluminum with electronically-welded Naugahyde upholstery. The smooth, integrated appearance of these chairs, shown here in four different styles, gives little indication to the lay person of the multitude of technical problems which had to be solved during the many months that the chair was being developed. Eames is especially well-known for his work in designing chairs that conform to human anatomy. Likewise he is a master in sculpt form. But have you tried to design a chair which would look equally good indoors as well as outdoors? Have you tried to fasten a fabric to metal without making it look like a nightmare? Can you come up with a comfortable, nonsagging, sling chair which refuses to look like one of the "latest" gowns?

The answers to these problems in the case of the Eames chair would have to be definitely in the affirmative, for Eames' genius in chair design is readily apparent. Incidentally, the fabric is held without stitching, lacing, or glue by a very clever rolled edge which fits in a groove in the outer edge of the aluminum frame.

Three final notes: the chair in the upper right has a Bassick tilting mechanism to make your comfort complete, the tables shown are available with marble, slate, or glass tops.—*Robert A. Tinkham, Associate Professor of Industrial Education, University of Illinois, Urbana.* ★

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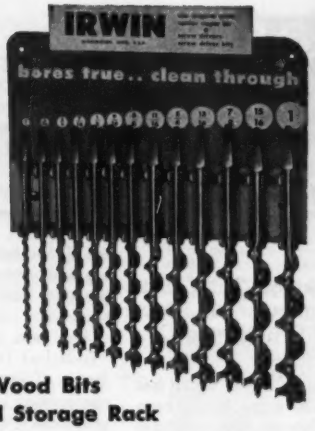

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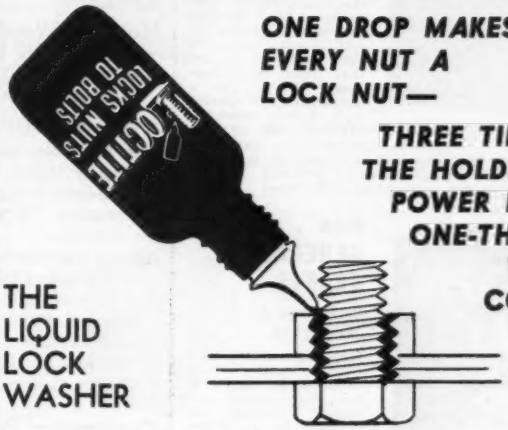

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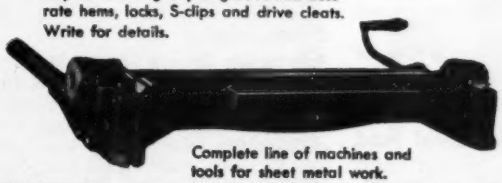

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Books:

Machine Woodworking. (Third Edition.) Smith. Bloomington, Ill.: McKnight & McKnight Publishing Co., 1958. Pp. 203. $3.60.

This is the third edition of a text which has been in popular use for 20 years. It has been completely revised and certain chapters have been added to bring it into harmony with modern practice. The various processes described are illustrated in a manner that even a beginner will find easy to follow.

Both pupils and do-it-yourself craftsmen will find the book to be a valuable reference.

Robert E. Smith is professor emeritus of industrial education, Ohio State University, and is presently on the staff at Southern Illinois University, Carbondale.

Construction Projects for Elementary Grades. Willoughby and Risk. Detroit: Royalle Publishing Co., 1958. Pp. vi+38. $1.00.

The projects included in this book have been selected because of their appropriateness for younger pupils. They have been found to be suitable for this group after several years of experimentation on the part of teachers in the elementary grades. They are presented in this publication as an aid to those teachers who are concerned with shop activities at the middle-grade level.

The illustrations are excellent, and they are accompanied by text material which is brief, but which leaves opportunities for the pupils to plan as well as to exercise their ingenuity in adapting the projects to meet any original ideas they may have.

George A. Willoughby and Norman Risk are members of the industrial-arts staff at Eastern Michigan College, Ypsilanti.

An Orientation to Technical and Shop Teaching. Dalton and Hodges. Ann Arbor, Mich.: Ulrich's Book Store, 1958. Pp. iv+92. $4.00.

This is a compilation of material, selected from various sources, which will serve as an excellent introduction to the field of industrial education.

Those responsible for the training of teachers in this area will find it to be an effective means of conveying to their students a picture of the objectives of shop training, as well as methods in common use for administering shop classes.

Francis W. Dalton and Lewis H. Hodges are members of the vocational staff of the school of education at the University of Michigan.

Technical Drawing. (Fourth Edition.) Giesecke, Mitchell, and Spencer. New York: The Macmillan Company, 1958. Pp. vii+844. $10.00.

The new edition of this 20-year-old standard text has been revised by Henry Cecil Spencer to bring it up to date. The new addition covers all the basic techniques in technical drawing and incorporates the latest standards and practice. New figures are used to illustrate the text.

Also new in this edition are a section on "Technical Terms" and a section on "Do's and Dont's of Practical Design." A new chapter of engineering graphics treats various methods of graphical computation, including nomography, arithmetic and algebraic solutions, and the graphical calculus. The new appendices incorporate the latest tables and include the new ASA tables of metal fits.

Henry Cecil Spencer is director of the department of technical drawing, Illinois Institute of Technology.

Physics and Mathematics in Electrical Communication. Perrine. New York: John F. Rider Publisher, Inc., 1958. Pp. 261. $7.50.

This book has been written for readers on a college level. It contains an explanation of what happens in electrical circuits that contain resistance, inductance, and capacitance. Numerous diagrams are included which point out and simplify concepts that are normally considered to be complicated.

The book should be of special interest to anyone who is concerned with study in the fields of physics, mathematics, and electrical engineering.

James Owen Perrine was assistant vice-president, American Telephone and Telegraph Company. Since his retirement he has been consultant to the Signal School at Fort Monmouth, N. J.

Pamphlets:

A Better Life Through Creative Manufacturing is a transcript of the remarks by radio commentator Alex Drier in tribute to the tool engineering field. This 15-page booklet is available free from the American Society of Tool Engineers, 10700 Puritan Ave., Detroit 38, Mich.

F.E.M.A. Handbook of Safety Codes outlines the various procedures for maintaining, protecting, recharging, and inspecting fire-extinguishing equipment commonly used in educational institutions. The 42-page booklet is available free from the Fire Equipment Manufacturers' Association, Inc., 1 Gateway Center, Pittsburgh 22, Pa.

Planned Training . . . Your Future Security is an eight-page pamphlet discussing preparation for craftsmanship in the skilled trades. The booklet, which explains apprentice training and its advantages to young people, is available free from the Bureau of Apprenticeship and Training, U. S. Department of Labor, Washington 25, D. C.

Your First Job is a 32-page booklet designed to provide helpful guidance to high-school students or graduates on getting a job. Topics considered include, "Where jobs come

from," "Your pay and the economy," "About the job, the employer, and you," "Customers are bosses, too," "You and your employers: the economic team," and "Your economic future." Copies are available from Education Department, National Association of Manufacturers, 2 E. 48th St., New York 17, N.Y.

Arc Welding, revised third edition, is a 44-page basic manual of instruction by William Sellon and John Matthews. Designed for high-school students and other beginning students, the book contains 92 drawings and pictures. Available for 50¢ from The James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio.

Industrial Arts for Georgia Schools is a 111-page handbook for teachers and school administrators covering all phases of the subject, including curricular patterns, administrative organization, planning, and evaluation. Available from the Georgia State Department of Education, Division of Vocational Education, Atlanta.

Audio-Visuals:

The Cranking circuit is a new 35mm film kit illustrating the internal construction and operation of a cranking circuit's electrical units. The kit includes a color slide film, a 12" record, and a leader's guide. A 20-page color booklet for use in review after the film is shown is also included. Film kit available for purchase or on free-loan basis by writing Technical Literature Section, Delco-Remy Division, General Motors Corporation, Anderson, Ind.

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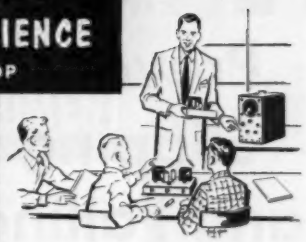

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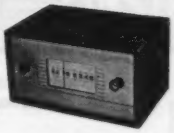

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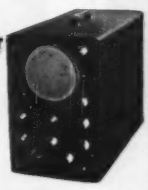

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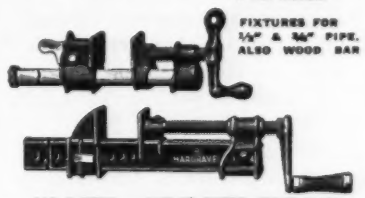

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news from Industry

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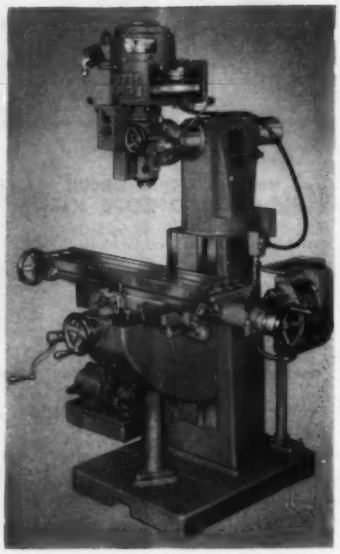
South Bend Adds Power Feed to Vertical Milling Machines



The South Bend Milling Machine Company has announced power feeds have been added to the table and quill of its vertical milling machines. It will increase the efficiency of the machines and ease their operation, the company claims.

The power feed, the company states, is provided for the spindle by means of a hydraulically operated mechanism with an infinitely variable range of feeds from 0 to 25" per minute. Also a new rapid traverse control is provided to permit positioning the quill with great speed.

Power longitudinal feeds for the table, the specifications indicate, are provided by an independent motor drive and lever-operated quick-change mechanism by means of telescoping feed shafts.

For additional information write to the firm at 425 E. Madison St., South Bend 22, Ind., mentioning SCHOOL SHOP; or *circle no. J-1 on the business-reply card.*

Pipe Bending Guide Speeds, Simplifies Job

A.J.D. Publications announces that "A.J.D. Practical Conduit Bending Guide" is a new and practical device for quickly obtaining all calculations needed to make bends for larger sized conduits and pipe installations for new building construction, alterations, and conversion.

The guide is a calculator of the slide-rule type which, when set to the desired radius, shows at a glance all the calculations necessary to make the bends on piping, using a segment-type bending machine.

For more information write to the company at P.O. Box 39, Tremont Station, New York 57, N.Y., mentioning SCHOOL SHOP; or *circle no. J-2 on the business-reply card.*

Wood Craftsmen's Course Completes Eighth Annual Session

Constantine's School for Craftsmen in Veneering, Upholstery, and Wood Finishing ended its Eighth Annual Session on December 13th.

Director of the wood-finishing program sponsored by Albert Constantine and Son, Inc., was Arthur Egner, chief wood-finishing consultant for the New York Wood Finishers Supply Co. Subjects covered were proper preparation of woods; various ways of finishing furniture, producing a satin finish, and producing a "mirror" finish.

The course met in the Constantine Bldg., 2050 Eastchester Road, Bronx, N.Y.

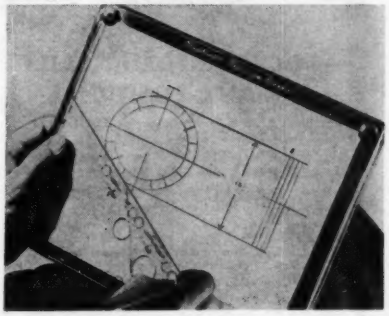
Auxiliary Power Unit Provides Safety Margin

The General Scientific Company has recently introduced a redesigned emergency lighting unit that assures instantaneous light when regular power fails.

The firm purports that this unit would be particularly suitable for school shops where "that extra margin of safety is a must." The firm states, too, that the unit is powered by a storage battery built into the portable set and a trickle charger automatically maintains the charge. The specifications note that the lights are sealed beams of 100 C.P. and will provide continuous light for 10 hours.

For more information write to the company at 7516 Limekiln Pike, Philadelphia 50, Pa., mentioning SCHOOL SHOP; or *circle no. J-3 on the business-reply card.*

Portable Drawing Board Weighs Less than Eight Ounces



Leslie Creations' new portable drawing board recently introduced by them is made

Send for free examination copy of this handbook!

Here Is the Cover

Machinists' Ready Reference

Compiled by C. Weingartner, Head, Machine-Shop Department, David Ranken Jr. School of Mechanical Trades, St. Louis, Missouri

Above is the cover and below is the coupon you can send in to receive a copy of MACHINISTS' READY REFERENCE for a 30-day free examination. Priced at $1.50—discount rates for purchases for class use—the handbook contains information on drills; tapers; screw threads; milling, shaping, and turning; gears; weights, gages, and tolerances; a host of mathematical information; and general metals information needed by advanced machine-shop and drafting students. Discount rates are; 10% on 10 to 50 copies; 20% on 51 or more.

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of high impact polystyrene and weighs about 7½ ounces. It comes complete with two plastic triangles—a 30°, 60° and a 45°—plus two retractable, metal straight edges.

The manufacturer claims the straight edges eliminate the need for a T-square. Four recessed spring-clips hold a standard 8½" x 11" sheet of paper on the board, eliminating the need of thumb tacks and tape to hold the paper in place. Rubber cushions, the firm adds, protect desk tops. The board's translucency makes it easy to produce tracings.

For more information write to the company, addressing your correspondence to Dept. ML, Lafayette Hill, Pa., mentioning SCHOOL SHOP; *or circle no. J-4 on the business-reply card.*

Craftsmen Machinery Has New Line of Paper Cutters

A new line of manual and hydraulic paper cutters has been announced by the Craftsmen Machinery Company.

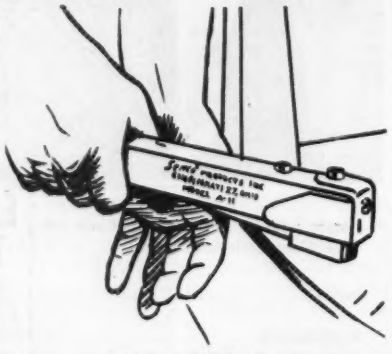
The new line consists of three basic types—the automatic cutter, semiautomatic cutter, and the lever model. All three models provide a 19½" maximum cutting width.

The automatic cutter has a cutting speed of about two seconds, according to the manufacturer. It cuts a full 3" lift of paper. Safety features pointed out by the company include "two-hand" operating controls, a knife-bar safety lock, and two steel handles for removing and adjusting the knife blade.

The semiautomatic model is similar to the automatic except that it provides a hydraulic-powered knife and a hand-operated paper clamp, instead of both being hydraulically controlled. The lever model cuts a 2½" lift of paper and features an interlocking back-gage with chain-drive action, a special "two-hand" safety device, and heavy construction throughout, the company declares.

For more information write Craftsmen Machinery Co., 75 W. Dedham St., Boston, Mass., mentioning SCHOOL SHOP; or *circle no. J-5 on the business-reply card.*

Senco Products Announces New "Rapid" Hammer Tacker



The new A-11 "Rapid" Tacker Hammer is now available from Senco Products, Inc. Less than 12" long, the two-pound hammer accommodates two full strips of high-carbon staples. The design of the hammer is such

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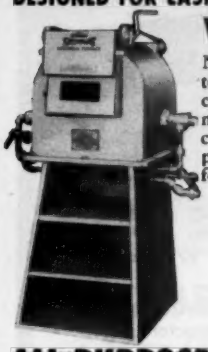

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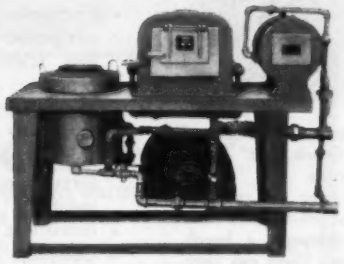

ALL PURPOSE FURNACE

Triple Purpose D, illustrated at right, is a combination pot, oven and forge furnace. Can be used for oven furnace hardening—lead, salt or cyanide hardening—lead, salt or oil tempering—forging, welding, tool dressing—annealing, normalizing, pack carburizing—non-ferrous metal melting. Also available in other combinations.

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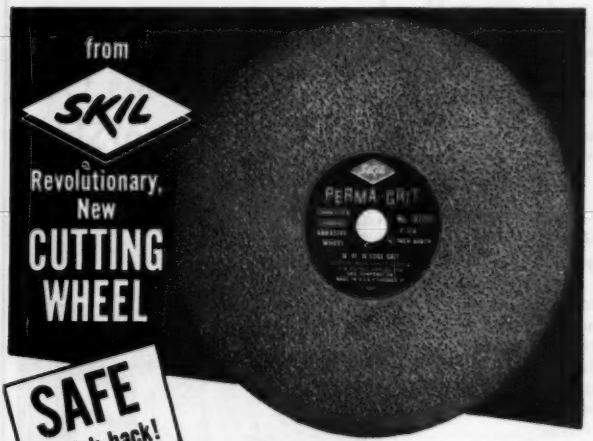

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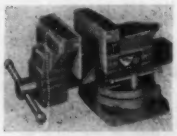
that it is particularly useful in the upholstery and woodworking shops. It drives and feeds staples automatically, leaving one hand free to hold material. The grip is made of shock-absorbing rubber and the hammer has so few parts that it can be completely disassembled in five seconds, states the company.

For further information write Senco Products, Inc., Cincinnati 27, Ohio, mentioning SCHOOL SHOP; or *circle no. J-6 on the business-reply card.*

Milwaukee Tool Expands Its Vise Line



Twenty-two different models of bench, woodworking, pipe, and machinists' vises are in the expanded and redesigned line of tools now offered by the Milwaukee Tool and Equipment Co. Among the new items are two "Quick-Shift" bench vises and two machinists' vises.

The two "Quick-Shift" vises are available in 3¾" x 5" jaw widths and are actually three vises in one, states the company—a bench, woodworkers', and pipe vise. Users can operate "Quick-Shift" vises conventionally, but if the special jaw lever is disengaged, the movable jaw can be positioned in or out instantly without touching the vise screw, it is claimed. Other features include 200° swivel with positive lock and face jaws of serrated heat-treated steel.

The two machinists' vises are of malleable iron—one with stationary base, the other with 360° swivel base, and both with 4" jaw width. Removable pipe jaws, fitting both models, handle ⅛" to 2½" pipe.

In addition, five new woodworking models, nine new bench vises, and three new malleable iron pipe vises, and a bench anvil are now available. All tools are enameled in baked hammered gray finish. For further information write Milwaukee Tool & Equipment Co., 2730 S. 29th St., Milwaukee, Wis., mentioning SCHOOL SHOP; or *circle no. J-7 on the business-reply card.*

New Literature:

Lafayette Radio: Everything in Electronics is the name of the new 258-page multicolored catalog recently published by the Lafayette Radio Company. It lists all of the electronic and radio equipment available from the firm. It is available by writing to the company at 165-08 Liberty Ave., Jamaica 33, N.Y., mentioning SCHOOL SHOP; or *circle no. J-8 on the business-reply card.*

Catalog 58, Electronic Testing Equipment is now available from Weinschel Engineering. The 32-page, two-color catalog, in addition to describing the test equipment, includes sections on definitions, insertion-loss measurements, masking out a mismatch by use of attenuator pads, and the importance of impedance matching in insertion-loss or power measurements. For a copy write Weinschel Engineering, 10503 Metropolitan Ave., Kensington, Md., mentioning SCHOOL SHOP; or *circle no. J-9 on the business-reply card.*

Fabrication Data of "Cadco" Extruded Acrylic Sheets is a 12-page bulletin published by the Cadillac Plastic and Chemical Company that gives complete information

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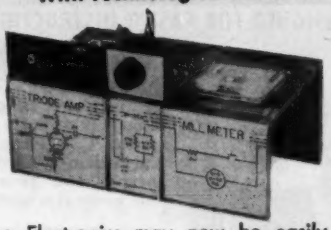

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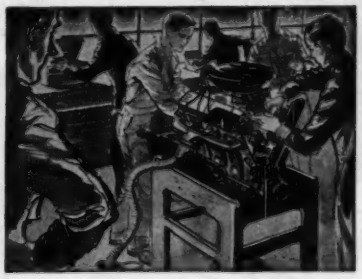

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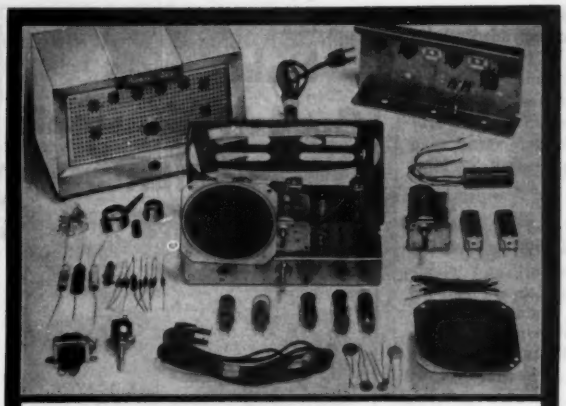

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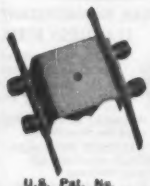

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Metal Cutting Band Saws is the title of a new eight-page catalog describing Johnson saw models. Specifications and photographs of all Johnson saw models are included as well as Johnson stock stands and accessories. For a copy write Johnson Manufacturing Corp., Crystal St., Albion, Mich., mentioning SCHOOL SHOP; or *circle no. J-11 on the business-reply card.*

Washington . . . *from page 52*

federal vocational education acts and to turn the activity back to the states.

Membership Lags.—The past year has not been a good one for professional associations which depend on voluntary membership. The NEA suffered a loss of 12 percent in 1958—dropping from 703,829 paid-up members in 1957 to 616,707. There was a period during the past 12 months when NEA officials were genuinely worried—and wondered whether the defection was due to the doubling of dues or to the dissatisfaction of southern teachers with the policies of their national organization. However, late in 1958 things began to pick up; the NEA began to regain losses at a rate that would put the membership back to the 703,829 level of 1957.

The AVA was also affected with membership apathy. On September 1, 1958, AVA counted 28,964 paid-up members, a drop of about 1,000 from the same date a year ago. It wasn't a bright picture and AVA officials said so. "This is alarming," said one AVA memorandum, "when we consider that a minority group is carrying the responsibility for promoting and improving a program that is benefiting such a large segment of our population." (AVA figures that there is a potential membership of 100,000 persons, but would be happy to enrol half that number.)

A close study of the AVA membership shows it is not a problem of national apathy, but rather apathy centered in a few states and localized in a few cities. Six states have an especially poor AVA membership record—and they are New York, Pennsylvania, Michigan, California, Texas, and New Jersey. Similarly, six cities show little interest in AVA activities—and they are Philadelphia, Detroit, San Francisco, St. Louis, Cleveland, and Boston.

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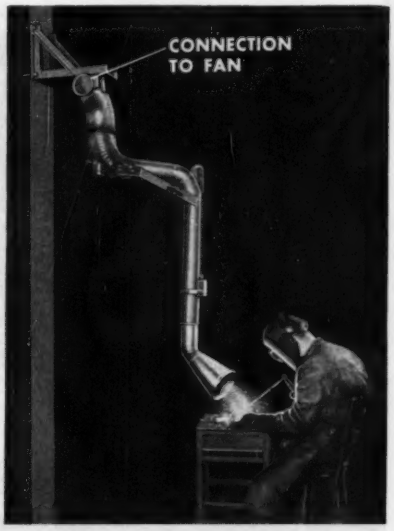

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"Area" and "Technician" Facts.—Is there anyone in the house still wondering what technicians may be trained under the National Defense Education Act? If so, your assignment is to read the new U.S. Office of Education regulations issued to carry out the intent of the Act. (The document has been labeled Misc. No. 3560.)

Is there anyone still unconvinced of the need for area vocational schools and programs? If so, *your* assignment will be to study the forthcoming AVA booklet to be entitled "Area Vocational Education Programs."

"Technician" and "area"—these two words sum up the great tasks in vocational education which have emerged during 1958 and which will require resolute action in 1959.

The two documents referred to above should help anyone to a better understanding of these two issues. The significance of the first document is that it seeks to make real the purposes of the new legislation. But a couple of additional points need to be said about it. In the regulations, for example, you will find official examples of just who is and who isn't eligible for training under the new act. Thus, eligible are electrical, electronic, industrial, industrial-chemical, instrument, and tool design technicians. Not eligible, because they are not considered essential to national defense, are agricultural, construction, food, health service, and textile technicians.

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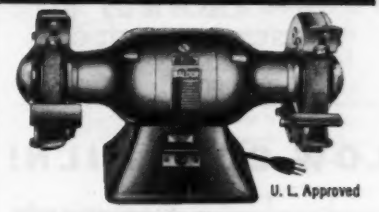

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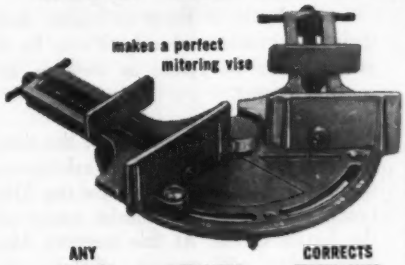

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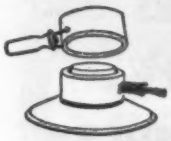

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U.S. Office of Education try to pinpoint once again what a highly skilled technician is, repeating that the "occupation must lie between that of the skilled crafts and the scientific profession" . . . that it must call into play theoretical and technical knowledge of science and math rather than manipulative skill.

As for the second document, this one from the AVA, it will provide (when it is off the press in a month or so) a refresher course on the meaning of an area program and give some tips on how to set one up. We choose at random some of the ideas that struck our fancy:

✔ Legislation is a necessity. Many communities will continue to provide inadequate vocational training until state legislatures make it possible to create administrative units capable of serving the vocational needs of all the people of the whole state.

✔ One of the greatest pitfalls threatening the success of the area vocational program is failure to integrate it into the public-school system and to cooperate fully with local boards and local school officials. They are apt to be your allies if they are consulted from the outset.

✔ The single most important part of the job (of setting up area vocational programs or schools) is to find the facts relative to the needs for vocational training and the advantages that will accrue from the larger administrative unit. Surveys (should be made) to determine . . . (and here we're paraphrasing) the number of potential students, their economic status and what training will be needed for them, needs of employers, costs of operating the program and where the money will come from, and what transportation problems are involved.

✔ And finally a word about housing. Leaders in the movement for area vocational programs should not be content with cast-off buildings, or dilapidated structures in out of the way places . . . Citizens should be made to realize that their area vocational school can be a great source of pride, as well as an economic asset.

The Russian Plan.—At about the time the 86th Congress meets in Washington, there will assemble in Moscow the 21st Congress of the Communist party of the Soviet Union. At this meeting, Mr. Khrushchev will present officially his 15-year plan for the development of the national economy of the U.S.S.R. We have a copy of Khrushchev's "theses" or highlights of the plan. They are theses which have implications for U.S. educators.

Mr. Khrushchev divides his 15-year

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plan into two phases. The first phase is a seven-year plan under which, he promises, there is to take place by 1965 "an 85 percent increase in the means of production and a 62 percent increase in the means of consumption." In other words, more tools and power to produce the tools and power needed for food, shelter, clothing, and missiles.

Getting down to details, Mr. Khrushchev says:

"A nearly twofold increase is planned in the output of the engineering and metal-working industries. In 1959-1965 the machine-building industry will ensure the manufacture of up-to-date equipment for all the sectors of the national economy, the creation and production of machines incorporating the latest achievements and discoveries in science and technology, particularly in radio-electronics; the theories of superconductivity, ultrasound, radioactive isotopes, transistors, and nuclear energy. At least 1300 automatic (automation) lines are to be put into service."

The gist of Mr. Khrushchev's theses is that the Soviet Union plans enormous increases in the production of iron, steel, aluminum, chemicals, electricity, oil, nickel, synthetic fibers, plastics, tractors, diesels, turbojets, wheat, telephones, household goods, and a hundred other items. He has not overlooked diamonds —promising a "14-fold increase in 1965 over 1958."

While economists argue whether Mr. Khrushchev is bragging or bluffing, let's look at the tie-in of education to these target goals.

The Russian's own words are as follows:

"A considerable expansion of general secondary education is to take place in the cities and rural areas, and the facilities for secondary and higher specialized education in night classes and by correspondence are to be extended. The total school enrolment will have increased to 38-40 million by 1965 compared with the 30 million of 1958. The switchover will be made from seven-year to eight-year universal compulsory schooling.

"Two million, three-hundred thousand specialists will be graduated from schools at the university level during the 1959-1965 period compared with the 1,700,000 of the preceding seven-year period."

Through education, Mr. Khrushchev says, his country will overtake and surpass the U.S. in per capita production, to insure for the Russians "the world's highest standard of living." Such is the challenge for American economy and for education. ★

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by Michael Paca

Congressional Ginger.—The Congress which meets this month is not only overwhelmingly Democratic, but is made up of individuals youngish in years, full of ginger, and venturesome. The typical lawmaker this year wants to do something for education and for civil rights—if only the not-so-youngish, not-so-venturesome "leadership" will let him. It may well be that the interest in education and civil rights will be combined in a piece of legislation to which the controlling "leadership" will not object. We hear that several bills are on the way seeking federal aid to school districts whose school plants are bombed by hatemongers or school segregationists. This legislative objective may become one of the safest and hence most popular.

But there are bigger goals, too. "Putting back the scholarships" is one of them. This means restoring to the National Defense Education Act of 1958 provisions for college scholarships, which the more frugal 85th Congress of last year had excised in favor of college loans. Certainly, efforts to amend and extend the National Defense Education Act will be a popular form of legislative activity. Some legislators will try to lengthen its life (it's limited to four years), and others will try to tack on scholarships, teacher-salary, and school-construction grants. Still others will try for brand new legislation—of the Murray-Metcalf type—seeking large sums of federal money for every major school expenditure.

Striking a Blow.—There exists in the federal government a rather inobtrusive little agency called the Commission on Civil Rights. Efforts will be made in Congress to make it more obtrusive. The Commission is concerned primarily with getting facts on how and why Americans are denied the right to vote, or to equal protection of the laws under the Constitution. It has no enforcement power, cannot take up individual discrimination cases, and is due to die November, 1959. But the fact that the Commission has decided to hold a national conference in Nashville, Tenn., next February on desegregation has suggested to some Congressmen that they can strike a blow for civil rights and for education by strengthening the Commission.

The Nashville conference is designed simply to throw broad beams of light on how 800 southern school districts have already integrated their schools without bombast or bombings.

Digestion Time.—Not much new in vocational-education legislation is expected at this session. "We have to digest what we have already bitten off," said one Washington educator. The challenge of setting up programs for highly skilled technicians under the Defense Education Act is one example of a large task authorized by legislation and still to be done.

But Congress may see another attempt to return vocational-education acts to the states. The Joint Federal-State Action Committee is still alive, still occupying space in the Executive Offices of the President. Of course, it is now the creature of a lame-duck President; five of the 11 state governors who were members of the Committee have been retired either in the elections of 1958 or in some other way; and it has practically nothing to show for its existence since June, 1957.

Nevertheless, there are plans to replace the five outgoing governors to bring the Committee to full strength; and officials of the Joint Federal-State Action Committee will certainly make one more effort to seek the repeal of

(*Continued on page* 48)

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54	Ohio Blow Pipe Co.	36
55	Oliver Machinery Co.	35
56	O'Neil-Irwin Mfg. Co.	35
58	Parent Metal Products, Inc.	33
59	Parks Woodworking Machine Co.	29
101	Patterson Bros.	47
60	Peck, Stow & Wilcox Co.	39
61	Pioneer-Toledo Corp.	50
62	Plastic Novelties	50
63	Plastic Products Co.	51
87	Frederick Post Co.	5
64	Powermatic Machine Co.	44
65	John F. Rider Publisher	33
66	Ruemelin Mfg. Co.	48
67	Howard W. Sams Co.	17
68	Sax Bros. Inc.	51
25	George Scherr Co.	47
69	Science Electronics, Inc.	27
70	Seeley's Ceramic Service	51
91	Sheldon Machine Co.	26
71	Skil Corp.	45
72	South Bend Lathe Works	Cov 4
4	Southern Screw	47
73	Stanley Tools	Cov 2
94	Stansi Scientific Co.	37
74	L. S. Starrett Co.	Cov 3
75	Sunbeam Equipment Corp.	45
76	James L. Taylor Mfg. Co.	50
77	Telephone Engineering Co.	50
78	Tepping Studio Supply Co.	50
79	Thos. C. Thompson Co.	50
80	Torit Mfg. Co.	43
81	Universal Scientific Co.	29
84	Versa-Vise	41
102	Wedgelock Corp.	49
82	Western Materials Co.	47
83	Western Wood Mfg. Co.	3
85	Wilton Tool Mfg. Co.	17
86	Yates-American Machine Co.	25

FOR COMPLETE PRODUCT INFORMATION USE THIS CARD

School Shop: Please have companies whose numbers I have circled below send me complete product information without further obligation. (This card is good until March 31, 1958.)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140

"News from Industry" Items

Please send me the following items listed in the "News from Industry" section of this issue of SCHOOL SHOP:

J1	J2	J3	J4	J5	J6	J7	J8	J9	J10
J11	J12	J13	J14	J15	J16	J17	J18	J19	J20

Name _____

School _____

School Address _____

City, Zone, State _____

_____

Subjects taught: _____

_____

Please send me information on: _____

1-57

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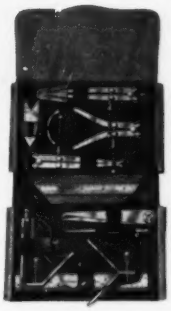
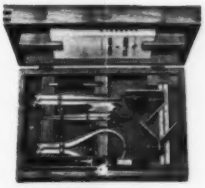
SET OF TOOLS NO. 900

Eight basic tools in a black leatherette case: 6" combination square with center head; 6" rule with pocket case and clip; center punch; center gage; 4" inside, outside and hermaphrodite calipers; 4" dividers.



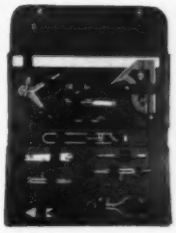


SET OF TOOLS NO. 901

Similar to Set No. 900 except tools are furnished in strong, attractively finished wood case plus a copy of "The Starrett Book for Student Machinists."

SETS OF TOOLS NO. 902 SERIES

More complete sets in durable, folding, artificial leather cases. No. 902A has 9" square; No. 902B 12" square plus 1" micrometer, center gage, center punch, 6" rule, 4" inside and outside calipers, dividers and hermaphrodite calipers.



NO. 22C 59 DEGREE DRILL POINT GAGE

Measures drill lip lengths and insures correct 59° point angles for best cutting. Also serves as plain rule, hook rule, depth gage, try square and slide caliper.

"SATIN CHROME" STEEL RULES

Flexible and spring tempered types, 6, 12, 18 and 24-inch lengths, fractional or decimal graduations. Easy to read with long wearing, no-glare Satin Chrome Finish (pioneered by Starrett).

Other Useful Dependable STARRETT TOOLS

No. 436 Outside Micrometer Caliper, one inch
No. 124A Inside Micrometer
No. 11 Combination Square, 12 inch
No. 1010 Dial Indicator Pocket Gage
No. 815 Toolmakers' Hammer
No. 86A Combination Hand Vise
No. 596 Pencil Divider
No. 54 Hold Downs
No. 196A Universal Dial Test Indicator
No. 29 Scratch Gage
No. 56A Toolmakers' Surface Gage
No. 172A Thickness Gage
No. 70A Pocket Scribers
No. 500 Steel Pocket Tape, 72 inch
No. 530 Steel Case Tape
No. 711F "Last Word" Dial Test Indicator
No. 50A Improved Trammels
No. 93A T-Handle Tap Wrench
No. 132 Bench Level, six inch
No. 129 Bench Block
No. 236H Depth and Angle Gage
No. 135 Pocket Level
No. 165 Double End Pin Vises
No. 166 Pin Vises
No. 579 Telescoping Gages
No. 185 Tap and Drill Gage
No. 187 Jobbers' Drill Gage
No. 167 Radius Gages
No. 829 Small Hole Gages
No. 555 Jewelers' Screw Drivers
No. 6 Screw Pitch Gage
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NEW HIGH SPEED WELDED EDGE HOLE SAWS

Double welded and shatterproof. For cutting clean, round holes in any machineable material. Sizes from 9/16" through 6" diameter.

NO. 153 HACKSAW FRAME

Adjustable for 8, 10 or 12-inch blades. Sturdy satin finish frame with tough rubber pistol grip. An ideal frame for use with Starrett hand hacksaw blades.

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New Bulletin 1203, "How to Read, Use, Care for Micrometers and Vernier Gages." Also, Training Aids Bulletin No. 1202 which shows the many Starrett training aids available free or at small cost. Write for your free copies. Address Dept. SS, The L. S. Starrett Company, Athol, Massachusetts, U.S.A.

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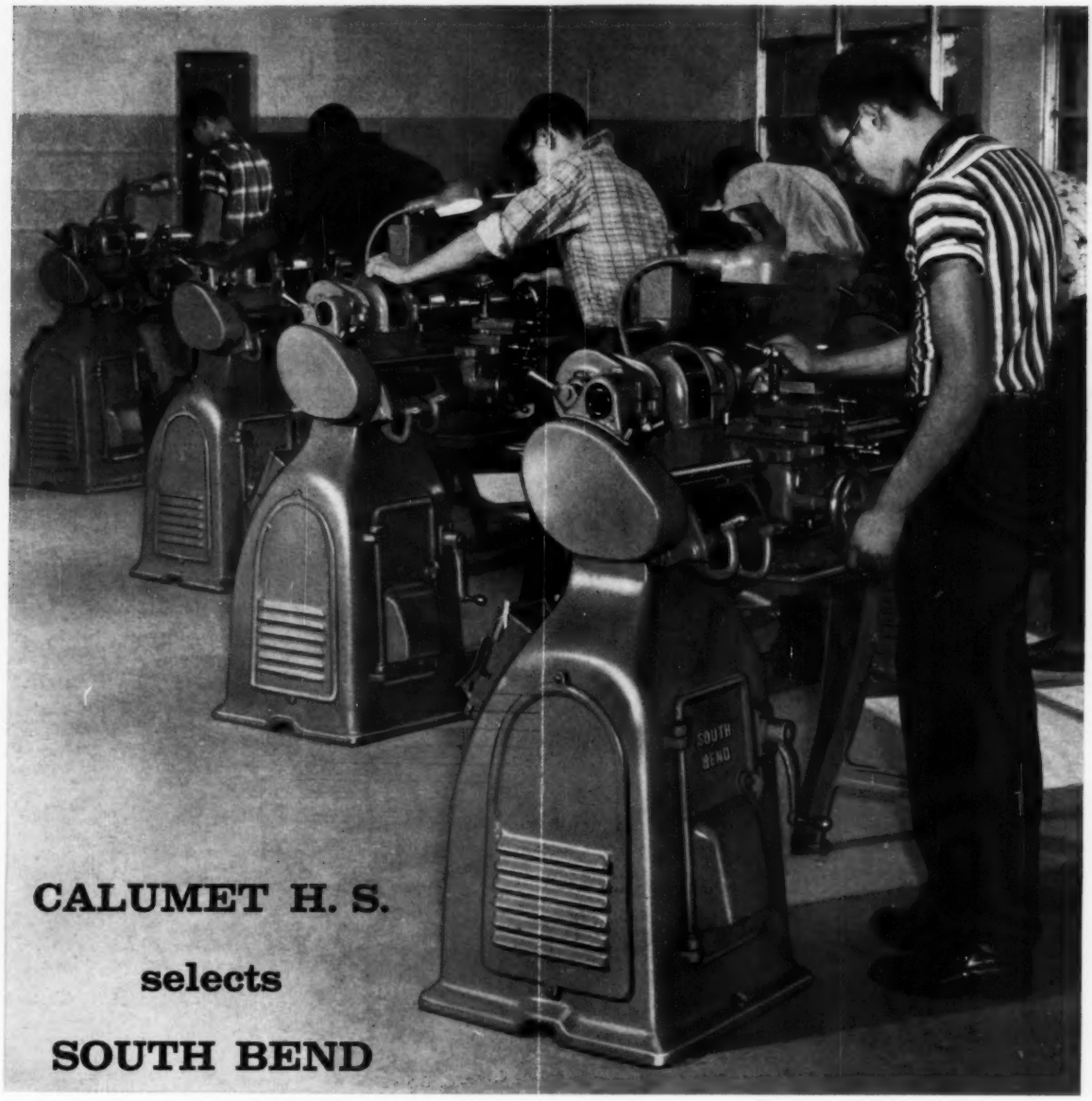

CALUMET H. S. selects SOUTH BEND 13" LATHES for their durability

Calumet High School of Gary, Ind. finds in South Bend 13" Lathes the durability they need for shop classes. Through experience they know that these ruggedly built lathes will give years of dependable service with very little maintenance.

South Bend 13" Lathes have long had a reputation for this performance among instructors. Built to meet the demanding requirements of industrial production they are ideal for school shops. The simplicity and ruggedness of the headstock, motor drive, gear box, carriage and tailstock make them as nearly "boy proof" as is possible. Their durability is just one of the things that makes them your best buy.

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